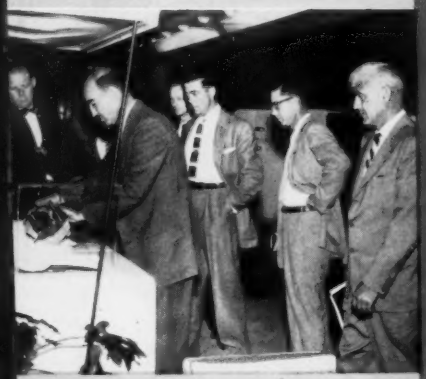
Water for 40,000,000 75



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ELECTRICAL WEST

August 1956
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

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Edison
is demonstrating
the speed of
electric cooking...
to speed up
your
electric range
sales

Electric cooking is fastest!

Now!
Hot soup
in 68 seconds
when you
cook
electrically!

TODAY, NOTHING COOKS FASTER than a modern electric range. Hot soup in 68 seconds. Bacon and eggs in 3½ minutes. Instant coffee in 60 seconds. Fry, bake, broil or roast – electricity does it better.

▶ THERE'S MORE: your kitchen is far cooler. And cleaner. Pots and pans stay mirror-bright. Kitchen walls look fresh and new much longer.

▶ SOMEDAY YOU'LL COOK on a modern electric range. It's almost inevitable. But why postpone it? Edison rates are among the lowest in the country. What's more, Edison services your range *free* as long as you own it. (The only charge is for parts, when needed.)

▶ IF YOU'RE STILL COOKING the old way, it's simply because you haven't seen the new '56 electric ranges at your appliance dealer's.

▶ VISIT HIM and Live Better – Electrically!

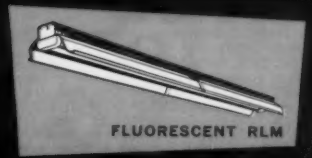
SOUTHERN CALIFORNIA Edison COMPANY

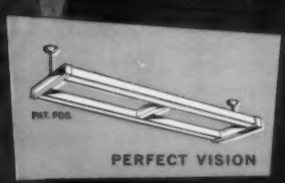
see the man from Smoot-Holman first!...

...for the best in school, commercial and industrial lighting

No matter how difficult the illumination problem — the Smoot-Holman lighting expert is the **man to see!** Here is trained "know-how" backed by Smoot-Holman's modern plant facilities and quality lighting equipment.

Call your local Smoot-Holman office or write direct. Ask to **see the man** from Smoot-Holman.





SMOOT-HOLMAN

INGLEWOOD, CALIFORNIA

We support the National Lighting Bureau

service in the west and southwest for all school, commercial and industrial lighting

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity."

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Next Month

September, the annual lighting issue, will feature an article on "What the Utility Lighting Man Means to the Industry." Other articles will deal with lighting on the Richmond-San Rafael bridge; residential lighting. Engineering will include articles on soniscope testing of dams by Southern California Edison Co. and a system diagram viewer by Utah Power & Light.

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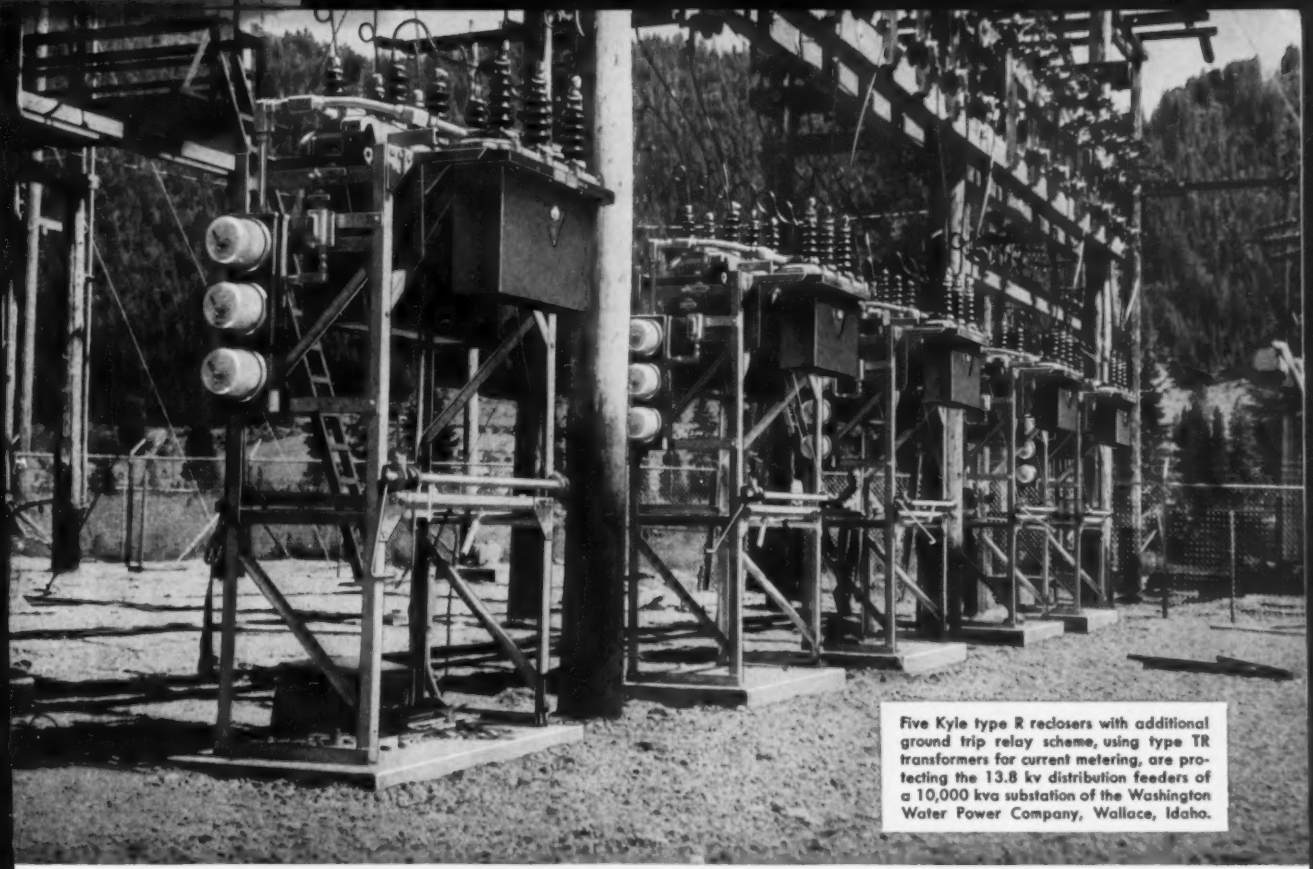


Five Kyle type R reclosers with additional ground trip relay scheme, using type TR transformers for current metering, are protecting the 13.8 kv distribution feeders of a 10,000 kva substation of the Washington Water Power Company, Wallace, Idaho.

Up To 90% Of Transient Faults Cleared . . .

High-Speed Kyle Type R Reclosers Help Improve Service Continuity

by **R. L. LEMMAN**
Apparatus Engineer
Line Material Company

L-M Kyle reclosers provide high-speed (2-cycle maximum) clearing of faults on the distribution system. This minimizes permanent system faults resulting from transient or non-persistent causes, and greatly improves service continuity. Up to 90% of transient faults can be cleared with Kyle reclosers with no significant damage to conductors.

Substation Applications

The Kyle type R three-phase recloser is a completely automatic, self-contained power class unit. Because the type R is a heavy-duty recloser it has applications in substations with up to 100,000 kva fault capacity.

The type R provides simultaneous tripping on all three phases of the feeder, to assure maximum protection against back feed or three-phase motor burnouts. Three time-current characteristics are available for series over-current tripping, with four operations to lockout in any of seven sequences. Normal reclosing time is two seconds. (25-cycle reclosing is available by simple field adjustment.)

Auxiliary Protective Schemes

Almost any relay scheme is adaptable to the type R recloser to supplement normal series over-current tripping.

Ground Trip Solenoid is a self-contained ground relay possessing its own dual time-current characteristics.

Shunt Trip Solenoid is a tripping device only, designed to operate the recloser when energized from a supplementary relay scheme.

Shunt Lockout Solenoid is a lockout device only; locks out the recloser instantly. Like the shunt trip solenoid it is energized by remote control.

Auxiliary Switch provides positions for remote-control indication or low-voltage control switching of apparatus used in conjunction with the type R recloser.

Ratings From 25 to 400 Amps.

The type R is available in normal load ratings from 25 to 400 amperes, with symmetrical RMS interrupting ratings up to 6000 amperes at 4.8 kv and below, and 4000 amperes up to 14.4 kv. Ratings can be increased in the field by simply changing the series trip coil.

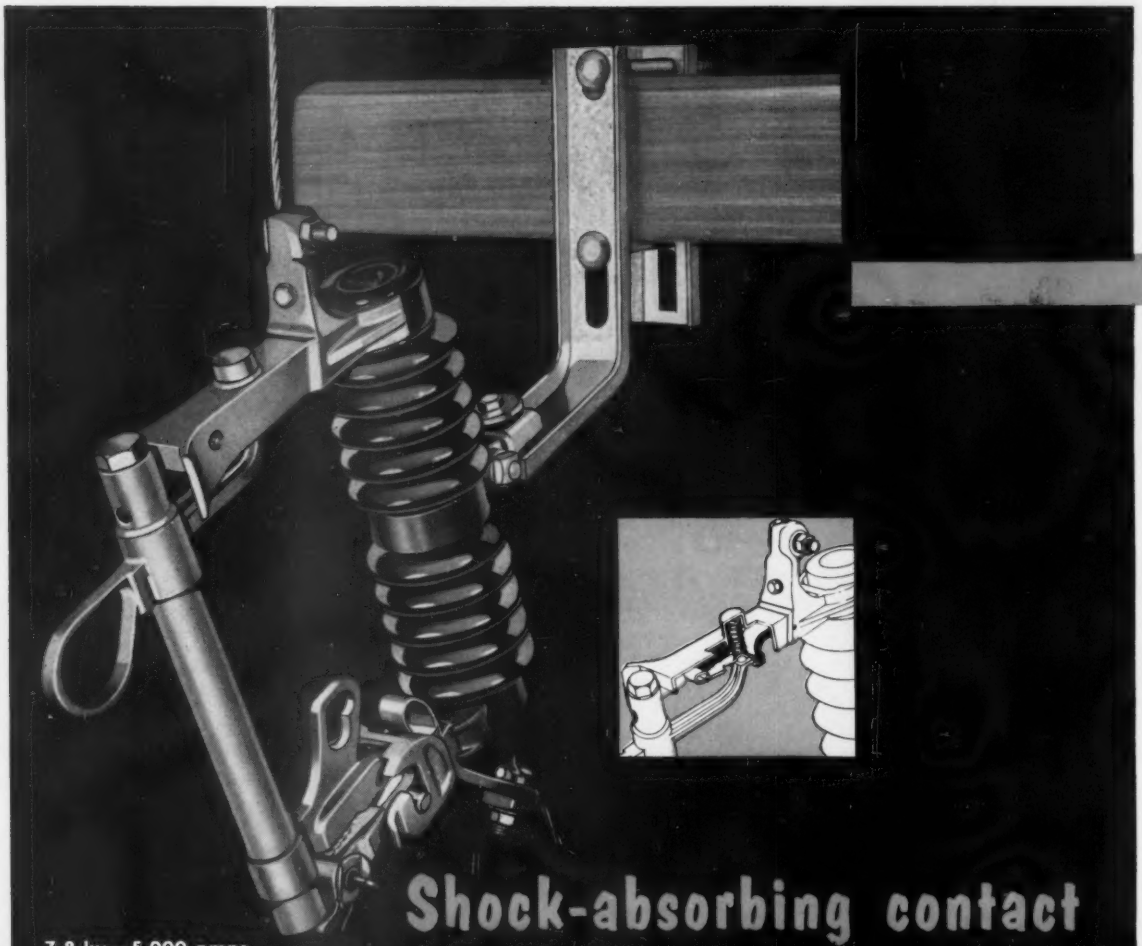
Get the Whole Story on L-M's Kyle Reclosers and Sectionalizers

Ask your L-M Field Engineer for information and bulletins on Kyle apparatus and complete coordination—single- and three-phase—from substation to load. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

264

LINE MATERIAL Kyle® Reclosers

A McGRAW ELECTRIC COMPANY DIVISION



7.8 kv—5,000 amps
15 kv—4,000 amps

Shock-absorbing contact allows front venting... eliminates contact burning

ON THE HEAVY DUTY KEARNEY TYPE "G" TRIP-OUT

This exclusive Kearney shock-absorbing contact construction allows the fuse cartridge to be front vented. Burning gasses are directed harmlessly away from the contact. The recoil is absorbed by two-way stainless steel springs. The whole cutout is designed to "roll with the punch."

With no burning gasses or damaging shock against it, the top contact remains as strong and tight as new . . . even after interrupting many faults. Notice that the covered design of the contact provides plenty of protection against weather and foreign matter.

JAMES R. KEARNEY CORPORATION
4224-42 CLAYTON AVENUE · ST. LOUIS 10, MISSOURI
Canadian Plant: GUELPH, ONTARIO

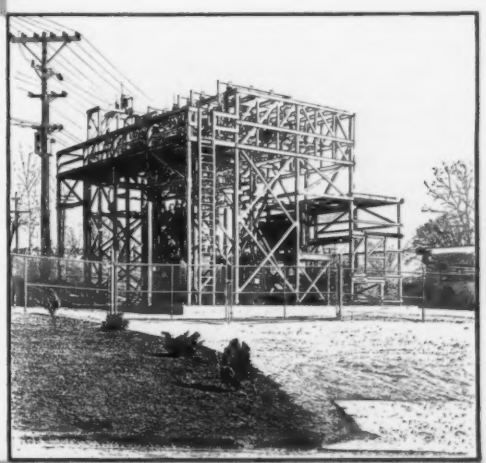
EXTRA HEAVY DUTY—Type "G"

7.8 kv—10,000 amps
15 kv—8,000 amps

Has the same advantages as the Heavy Duty Type "G" plus a more rugged fuse cartridge to withstand repeated high faults. Cutout is equally dependable for interrupting low current faults. Opening action causes the burned link to be "whipped" out... assuring a fast, complete interruption... without having to depend on expulsion force.

CUTOUTS FIELD TESTED...

Here at KEARNEY's Substation Laboratory of 150,000 KVA Transformer Capacity—with a back up power of 445,000 KVA all equipment is tested under rigorous field conditions. KEARNEY Certified Ratings are actual, proved performance ratings... not just theoretical calculations. You can be sure they will do the job they are supposed to do... with a generous margin of safety.



JRK-310R

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify KEARNEY PRODUCTS

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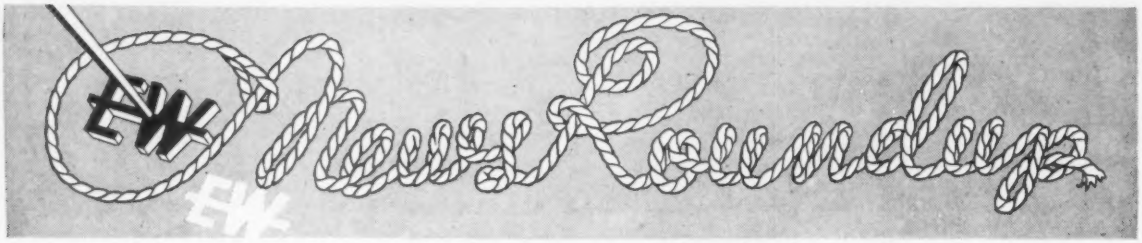


SIGNIFICANT ITEMS FROM THE EDITORS' NOTEBOOKS

SUPPORT—Pacific Northwest Power Co. received support from many Northwest citizens in the early part of July at Federal Power Commission hearings held at Pendleton, Ore., and Lewiston, Ida. The hearings were held on the company's application for a permit to build Mountain Sheep and Pleasant Valley Dams on the Snake River.

Public power interests of the region provided most of the opposition, of course, but also some of the support. The City of Tacoma; Grant County, Wash., PUD; McMinnville, Ore.; and Eugene, Ore., testified to the region's urgent need for power, and asked that a license be granted if the FPC felt the PNP proposal measures up to comprehensive development.

Also lined up in support of the private company's plan for development were four International Brotherhood of Electrical Workers locals and the Spokane Teamsters local.

Sportsmen, too, were among the people favoring PNP's project. T. H. Wegner, representing the 20,000 members of the Idaho Wildlife Federation of 90 sports clubs, said:

"Sportsmen have been greatly encouraged by the studies in which PNP has participated to protect the fish life, and we have no doubt that funds will be set aside and some acceptable compensation brought about."

—EW—

Valley Electrical Supply Co., Fresno, a subsidiary of Pacific Gas and Electric Co., will be sold to General Electric Co. August 31. More details about the pioneer appliance wholesale firm are in the Sales Guide News Letter.

—EW—

BOOSTER—The purchase of Stevens County PUD by Washington Water Power Co. Last year had one effect that is a shade toward the amazing side. The new WWP customers acquired in the transaction increased their appliance purchases an average of 62.4% in the first five months of 1956 as compared with the same period last year.

Sales Guide News Letter has more of the happy details of the sudden upswing in purchases, which is now settling back to presale normal.

—EW—

Electrical West will miss the warm, friendly presence of Walt Heston, engineering editor, who died July 6, as will many more of his friends when he doesn't show up at conventions, construction projects, offices and the countless other places he explored in the line of duty. His monument is here in our hallway. It consists of a total of 23 years of bound volumes of Electrical West and Electrical World, whose pages carried Walt's comprehensive, step-by-step reports of Western electrical industry progress through the years.

Denver will soon have its first full-scale solar heated home. Dr. George O. G. Lof, consulting engineer and internationally known expert on solar energy, is building a $40,000, nine-room home in Cherry Hills. The auxiliary heating will be natural gas, but it will have an electrically operated blower that circulates air at the rate of 1,000 cfm.

—EW—

NEW PRODUCT—New aluminum products are making news at every turn, but Alcoa's *News Letter* reports on one that should cap the jug.

A stork in Florida broke off a section of its lower bill and Jones Shutter Products Co., Miami, made an aluminum replacement that works fine.

Comments the *News Letter:* "don't think for a minute that aluminum is only for the birds."

PURCHASE—A pioneer California manufacturing firm, Kelman Electric & Mfg. Co., Los Angeles, has been purchased by I-T-E Circuit Breaker Co.

I-T-E acquired all the capital stock of Kelman in an exchange with the owners and founders.

Kelman, founded in 1908, manufactures high-voltage circuit breakers rated from 7.2 kv to 220 kv with interrupting ratings to 10,000,000 kva.

—EW—

Farmers in western Washington can tell when to irrigate and how much with use of an "irrigage" furnished by Puget Sound Power & Light Co. The electronic device, through a metal stake driven into the ground, measures soil moisture down to 2 ft.

—EW—

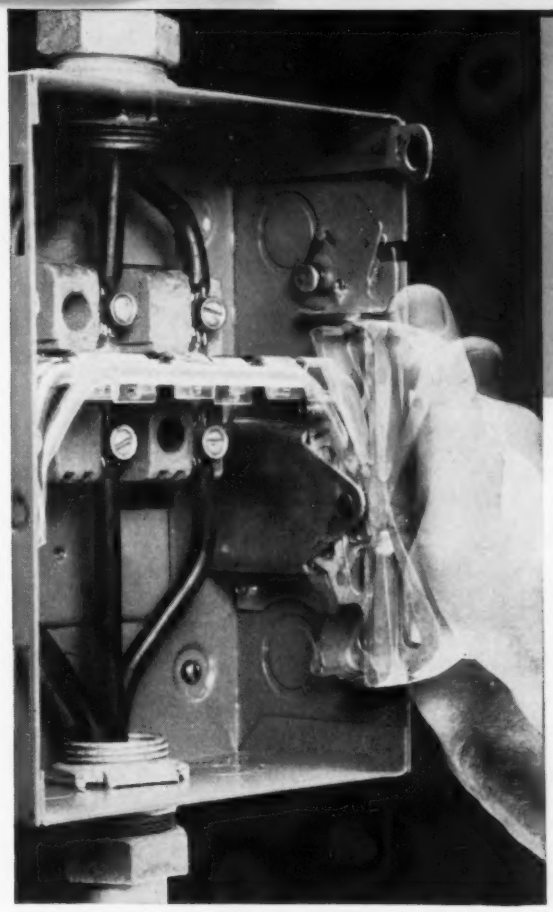
HARMONY—The word is out that the British government and the Canadian government have reached an agreement on what to ask of the U. S. for downstream benefits in the event the Mica Creek Dam in Canada becomes a reality.

It is estimated that sale of 40% of the power from the project, which will develop about 2,000,000 hp, to the U.S., would pay for the dam in 50 years. The question has been: "How much power will we export?"

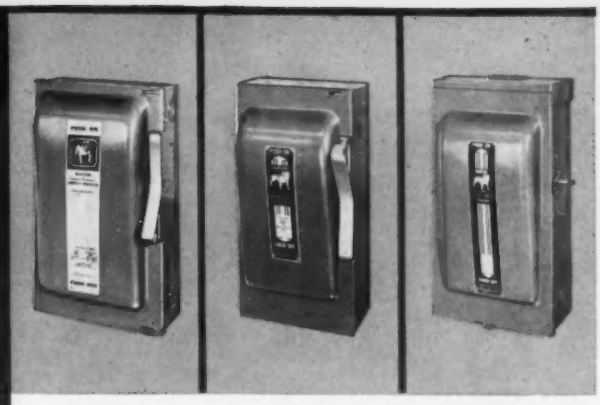
—EW—

TAX ISSUE—A presidential election year is the time to face critical issues of national importance. This is the feeling of the National Association of Manufacturers who call for forthright political discussion of the tax question.

NAM asserts that the federal government surplus, plus the probable increasing revenues over the next five years as a result of the expanding economy, makes it possible to make substantial reductions in income taxes. The association calls for progressive reductions in each of the next five years



The positive arc-restricting switching action of BullDog's Clampmatic Vacu-Break Safety Switches is shown in the above demonstration photo of the switch interior. In all normal operation, the switch box door is closed.



MASTER CLAMPMATIC VACU-BREAK — Unequaled for quality and performance. Acts as disconnect or service entrance switch. Fills applications up to 1200 amps.

JUNIOR CLAMPMATIC VACU-BREAK—Deluxe general-purpose switch at an exceptionally low price. The complete line ranges in ratings from 30 to 600 amps.

RAINTIGHT CLAMPMATIC VACU-BREAK — Provides complete protection from rain, snow and sleet. Complete line ranges in ratings from 30 amp to 200 amp sizes.

Switch with Security!

GET BULLDOG CLAMPMATIC VACU-BREAK SAFETY SWITCHES

Greater safety . . . longer life . . . no costly maintenance!

BullDog Safety Switches bring you real extras — in safety, in performance, in longer life. The three types shown — Master, Junior and Raintight — cover a wide range of applications, meeting your needs with greater efficiency.

They feature these *Big 3* BullDog exclusives: (1) Vacu-Break® arc control, (2) Clampmatic® action, and (3) dependable switch mechanism.

The Vacu-Break control smothers arcs, minimizes pitting and burning. The Clampmatic action provides bolt-tight contact pressure. The BullDog switch mechanism *guarantees* positive switching security.

You'll find it's a switch to economy when you switch to BullDog Safety Switches. Consult your qualified electrical contractor or BullDog field engineer, or write BullDog Electric Products Co., Detroit 32, Mich.

© BEPCO

IF IT'S NEW... IF IT'S DIFFERENT... IF IT'S BETTER... IT'S **BULLDOG**

ELECTRIC PRODUCTS COMPANY

A Division of I-T-E Circuit Breaker Company

Export Division: 13 East 40th Street, New York 16, N. Y. • *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Road, Toronto 15, Ont.

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

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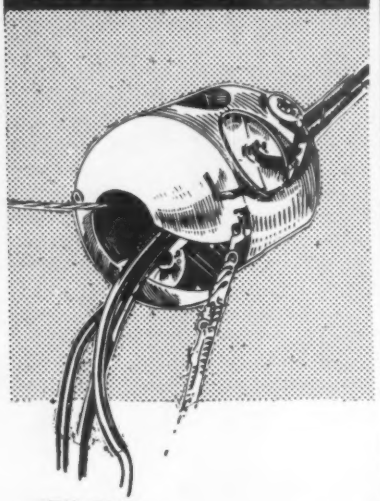
1733 N.E. Seventh Avenue, P.O. Box 7712
Portland 12, Oregon

YOUNG ELECTRIC & MFG. CO.
2134 Curtis St.
Denver 2, Colorado

SAFETY SWITCHBOARD COMPANY
910—89th Avenue
Oakland 21, California

BULLDOG ELEC. PROD. CO. OF LOS ANGELES
2885 E. Washington Blvd.
Los Angeles 23, California

THREE TO ONE



IT'S THE
NEALE MODEL "K"
Only the
Model "K" Spinner
PLACES & SPINS
THREE SINGLE CABLES
Into
ONE COMPACT UNIT

ALSO SPINS SINGLE CABLE PERFECTLY

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Pirelli of Great Britain

to bring the top rate down to 35% for both corporate and personal income taxes by 1960. This move, according to NAM, would stabilize the economy, help develop the new capital needed for industrial expansion and curb inflationary tendencies arising out of the dependence on bank credit for capital expansion purposes.

If there's any one thing that is as certain as death and taxes, it's the fact that the politicians will never voluntarily reduce their demands for additional levies. Only the voters can force such reductions. Maybe this IS a good time to beat the drums for a lightened tax load.

—EW—

FHA financing of built-in appliances was called up for review by the Senate banking committee in its report on the 1956 housing bill. A proposed amendment, designed to curtail the sale of household equipment as part of the mortgage, was included. It called them "rapidly wasting assets."

—EW—

SHORTAGE—The federal government really operates under a handicap in trying to hire and hold engineers. All told federal agencies have on their pay roll some 43,000 engineers of all kinds and they're out to take an additional 8,700 in the year ahead.

On fringe benefits, such as retirement, insurance and vacations, the federal agencies can compete with industry. They operate under the handicap of lower salaries and lack of room at the top. Legislation is being worked on to help the situation. For example, Congress is in the process of passing a law that will create more than 300 additional posts paying $10,000 to $15,000 a year for professional and scientific people. The Civil Service Commission is also expected to approve higher starting salaries for the middle salary classifications.

Even so, some of the federal agencies have a particularly tough time. For example, the Corps of Engineers, which needs to maintain a staff of more than 8,000 civilian professional engineers, should be recruiting 500 or more engineering graduates each year. Despite intensive efforts, it looks as though the figure will be only about 125 this year.

Other federal agencies also in the engineering recruiting business are making good use of student training programs for undergraduate students. The USBR with an engineering staff of about 2,100 was able to recruit nearly 60 beginning engineers from the college graduates this year. And there are some 350 students enrolled in this summer training program.

Incidentally, the Civil Service Commission recently granted increase in the starting salaries for young engineers. Those with a B.S. degree now start at $4,480 annually and those with a master's degree at $5,335.

—EW—

The newest peacetime atomic application is the use of irradiation to protect and preserve foods in transit. In loading a freight car, the food is passed through a unit which irradiates it sufficiently to delay decay while en route to the consumer.

—EW—

RHUBARB—The newspaper advertisement of the electric companies' advertising program which discussed atomic progress in the U. S., caused the eruption of a teapot tempest on the Senate floor. Senators Anderson (D-N.M.) and Gore (D-Tenn.) had the complete ad and a list of all newspapers in which it appeared inserted in the Congressional Record. Both solons branded the ad as misleading and inaccurate.

An aftermath of the ruckus was the vote by the House Appropriations Committee to begin an investigation "of the circumstances surrounding the recent ECAP advertisement on atomic power." The main point of controversy seemed to be the statement that the U. S. had 90 atomic reactors as compared to 11 for the Soviet Union.

—EW—

A revolutionary new concept in electronics production—a stacked ceramic instead of glass receiving tube for television use—has been announced by a Bay area manufacturer. Tubes will withstand heat and shock forces found in guided missiles and are so shock-resistant and long lived that they are wired directly into circuits. Tubes will be available soon for civilian consumer use.

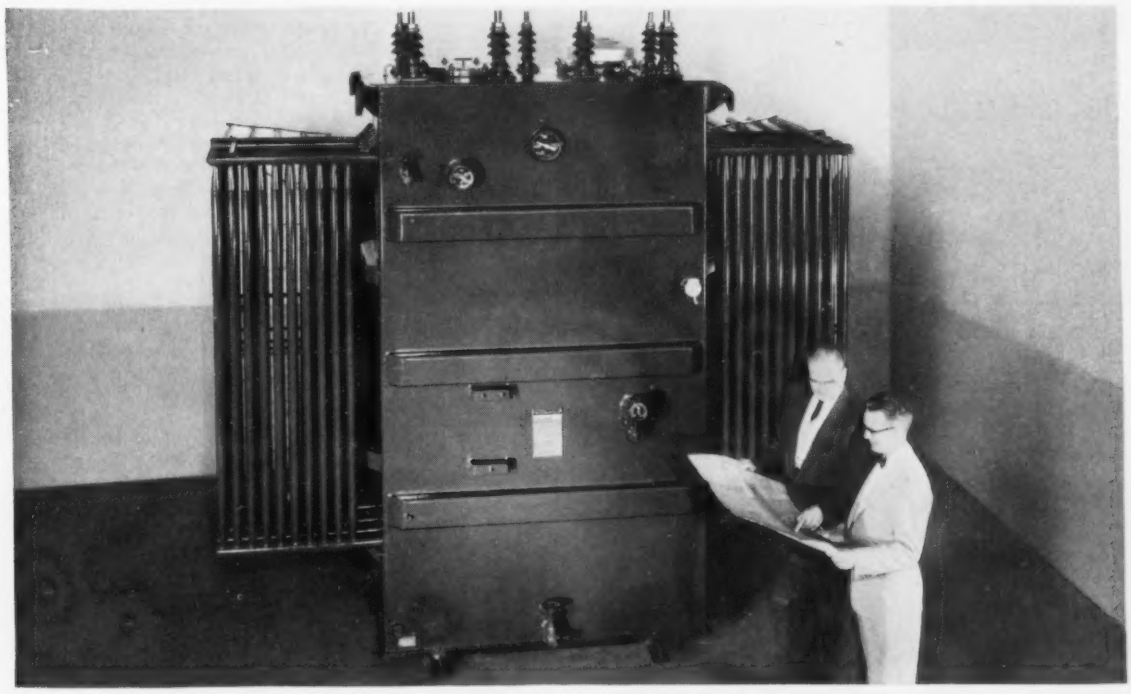
—EW—

WESTERN SHARE—The new "pay-as-you-build" highway program is expected to get under way in jig time. Commerce Secretary Weeks signed the apportionments to the states of moneys covering fiscal year 1957. He characterized the Federal-Aid Highway Act of 1956 as the greatest highway pro-

Design time... five minutes

WESTINGHOUSE ENGINEERS are now designing mathematically perfect power transformers with new IBM-705 electronic computers . . . in minutes.

J. C. Rissinger, Manager Substation Equipment Sales, reviews design improvements with Gordon Monroe, Section Mgr., Engineering Department . . . many made possible by freeing engineers from routine design calculations.



Automation has come to transformer design. Two new Westinghouse computers telescope design time to just short of nothing. That's important because designing a well-balanced transformer has been a complex and time-consuming job. Now, such factors as impedance, losses, sound level, temperature rise and dielectric strength are all integrated into product design—automatically, literally in 5 minutes.

The exclusive application of this Westinghouse pioneered innovation to the complete design of power transformers means products of mathematically perfect quality.

Specification and purchasing are simpler. Exact design information is right on hand at the time the order is negotiated. Eliminating 99% of our design time means you get faster delivery.

The time of, literally, dozens of engineers is being made available for creative development work on new and better transformers. Even when product performance already represents industry leadership, you can depend on Westinghouse to introduce new ideas that make any Westinghouse transformer a better buy.

Get in touch with your Westinghouse sales engineer, today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70767

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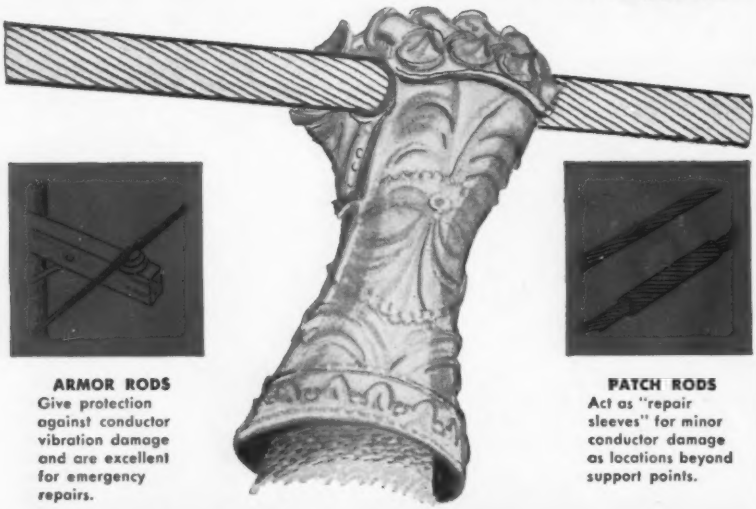
COVER THE PRESIDENTIAL CAMPAIGN ON CBS TV AND RADIO!

WHEREVER Protection IS NEEDED
ON OVERHEAD CONDUCTOR LINES

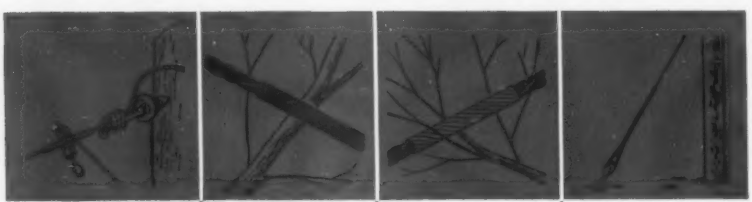
fine FANNER Superformed PRODUCTS

provide it better . . . easier . . . at substantial savings



ARMOR RODS
Give protection against conductor vibration damage and are excellent for emergency repairs.

PATCH RODS
Act as "repair sleeves" for minor conductor damage as locations beyond support points.



TAP ARMOR
Protective layer of shortened rods facilitate making taps without risking conductor damage.

PLASTIC FANNGUARDS
Tough, durable plastic sleeves used on covered wires for protection against tree abrasion.

ALUMINUM LINEGUARDS
Made to protect triplex cable or bare conductors against abrasion electrical damage.

FANNGRIPS
For a permanently positive grip on guy strand with maximum economy in material and labor.

Whenever you need accessory items for overhead distribution and transmission lines, you'll do far better by standardizing on Fine FANNER Superformed PRODUCTS. Each product in the FANNER Superformed line is precision manufactured to install easier and faster on the job. Careful packing insures safe delivery and simplified storage. Highest quality materials provide long life regardless of the type of installation. With all their extra features, FANNER Superformed PRODUCTS cost no more than ordinary products. For full information on the Fine FANNER Superformed Line, write for literature and prices today!

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Fine FANNER Superformed

THE FANNER MANUFACTURING CO.
Electrical Products Division
Brookside Park Established 1894 Cleveland 9, Ohio

AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES

gram and the greatest public works program in the history of the world.

Fiscal '57 funds have been made available and apportioned. The 11 Western states will receive more than $349,000,000 for that year. In 1958 it will be $457,300,000 and go up to $515,700,000 in 1959. Nationally and regionally expenditures of this magnitude cannot help but be a shot in the arm for the economy.

—EW—

LEGALITY of long-term contracts for establishing special lighting districts by Montana municipalities is being questioned by two Helena attorneys who are property owners.

The practice being following is for special lighting districts to enter into a contractual agreement with a utility. The utility provides lights, poles and maintenance of the system for a monthly charge to residents of the district.

Attorneys John Marchi and Leif Erickson contend that the proposal to carry the obligation by monthly charges is in violation of the law. They say the lighting should be paid for by special improvement bonds and warrants.

The case has been to the Montana Supreme Court now, which referred it back to district court for trial.

—EW—

Ground was broken July 27 for the new Ramo-Wooldridge plant near Englewood, Colo. Located on a 640-acre site, the production center for electronic systems will cover 140,000 sq ft.

—EW—

FUTURE of the West Coast as a major center of atomic power developments was predicted by George White, general manager of General Electric's atomic power equipment department.

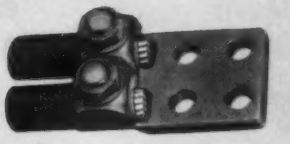
He said that a "rapidly increasing per cent" of nuclear engineering is being concentrated on the West Coast, particularly in California and the San Francisco area. Engineers at these facilities, he said, must "make progress of a magnitude comparable only to development of the electric power industry itself."

—EW—

Here's a definition for your next speech-making situation;

A PROGRAM: Any assignment that can't be completed by one telephone call.

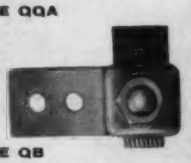
how's your QA-IQ?



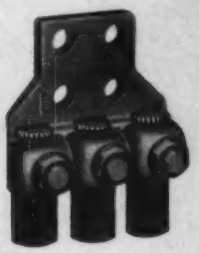
TYPE Q2A

TYPE QA-90

TYPE QQA



TYPE Q8



TYPE Q3A

Did you know all of these terminals incorporate all standard Qiklug features?

Popular sizes in stock to meet your individual requirements.

QIKLUG
TYPE QA-B

Available for wire sizes #14 thru 2000Mcm.

Get the right answers to all your connector problems.
Write for Burndy Pocket Catalog P-52, filled with facts you'll want in your pocket.

BURNDY

56-1

Norwalk, Connect. • Toronto, Canada • Other Factories: New York, Calif., Toronto • Export: Philips Export Corp.

1½ kva too small?

G-E Service Shop

uprates to 5 kva!

There's lots of life in your old distribution transformers yet! Just let your local G-E Service Shop replace the old cores and coils with new factory-built units of higher kva capacity. Your transformers are returned good as new. There are 31 G-E Service Shops throughout the country—one near you. 431-33

Progress Is Our Most Important Product

GENERAL ELECTRIC

GROWING PAINS—The popularity of having working models of hydroelectric projects is fast making the hydraulics laboratory of the Washington State Institute of Technology one of the largest in the nation.

At this time the Institute has no less than five such models, and the latest, a model of Rocky Reach Dam, had to be built outdoors with the building to come later.

A new 10,200-sq-ft laboratory was just completed a year ago and another 5,300 ft will be added by winter. The five models are all or part of Rocky Reach, Brownlee, Noxon Rapids, Priest Rapids and Pleasant Valley.

—EW—

DOG DAYS—The U. S. Postoffice Department is taking the bad-dog situation seriously. Its faithful employees, the postmen of the country, suffer about 6,000 dog bites annually.

The problem is being tackled on three fronts. One school of thought recommends padded pants. Another group is searching for a spray that will give the mailman b.o. as far as dogs are concerned. Still another group is relying on dog psychology and are struggling to find the right approach to lessen canine delinquency.

Any answers will be deeply appreciated by meter readers, delivery men and other service people who have to challenge Fido on his home grounds.

—EW—

Pernicious softening of the curriculum in the public school system and incompetence of teachers are chiefly responsible for shortage of technical manpower, says Dr. Arnold O. Beckman, president of the Los Angeles Chamber of Commerce. He said schools had permitted progressive deterioration in the rigor of mental training and disciplines, and that many science teachers are not even interested in science—much less competent to teach it.

—EW—

CORROSION TESTS—A marine atmosphere is hard on electrical facilities, as the coastal utility folks will testify. Hawaiian Electric Co. and Kaiser Aluminum & Chemical Corp. have set out to find some solutions to the corrosion problems by setting up test facilities in four notoriously severe corrosion-producing areas in Hawaii.

Tested will be conductor, triplex services, hardware and triplex secondary and mid-span service installations. Each is at a different location.

Although Kaiser and Heco initiated the tests, other manufacturers were invited to send in their products.

Results will be made available to the electrical industry as the tests progress, probably over a five-year period.

—EW—

Speeds up to 99 miles a minute, or 5,940 miles per hour, will be available in a new 21-in. wind tunnel at Cal Tech for testing scale-model missiles, projectiles and airplanes. Westinghouse is building the wind tunnel at its Sunnyvale, Calif., plant for operation in 1957.

—EW—

How can you expect kids to study when they see adults miss a question on television and win a Cadillac?

—EW—

SHIFTY—"Manoeverability (British spelling) on the water compared to that of a helicopter in the air" is the way the *Ocean Layer*, a cable-laying ship, is described by British Columbia Electrical Railway's *Buzzer*. The ship is being used by British Columbia Electric Co. to string five cables underwater from the lower mainland to southern Vancouver Island.

The ship has an auxiliary motor-driven propeller in her rudder blade to provide exceptional turning ability.

The cable is 138 kv—the highest capacity submarine cable yet built.

—EW—

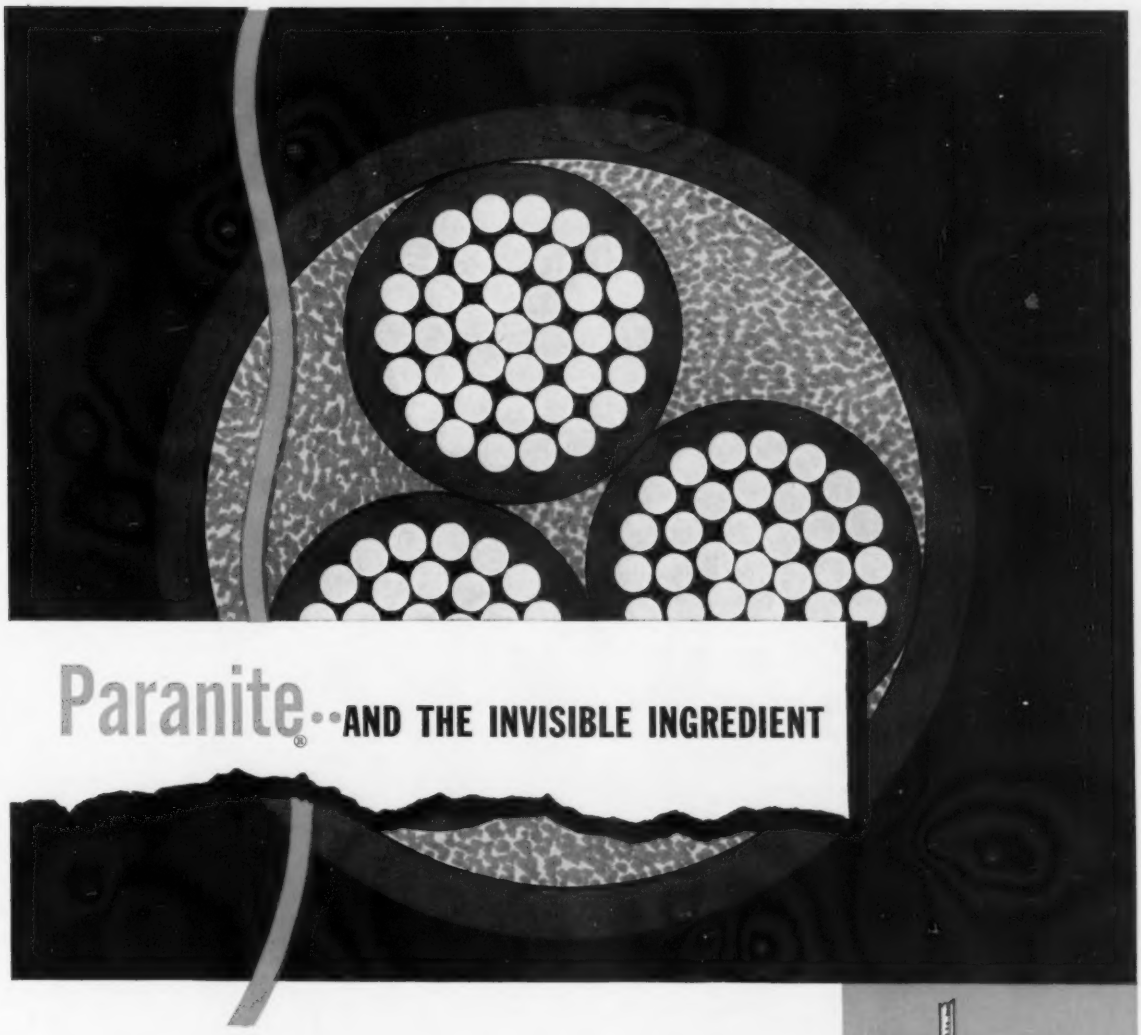
Arizona Public Service Co. is going to build a $246,599, air-conditioned building for its Univac computing equipment.

—EW—

TEAMING UP—Members of the Washington PUD Assn. will soon be called on to say whether they favor a joint operating agency to construct and operate a 200,000-kw steam plant and several small hydroelectric projects.

The plan was adopted by the board of directors of the association and referred back to individual PUDs for action.

The thing to watch for is a possible court test of a 1955 law that put state approval of this type of agency in the hands of the state director of conservation and development instead of the state power commission. A similar agency was planned before the new law but failed to get power commission approval.



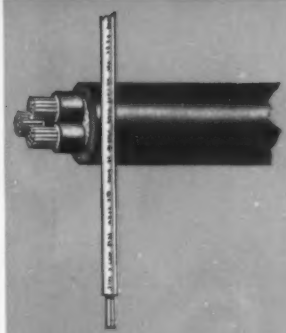
Paranite®—AND THE INVISIBLE INGREDIENT

● Electricians know the various types of wire and cable, of what they are made, and their proper application. But with Paranite products there is an "extra" that you cannot see . . . or feel . . . for Paranite is a perfectionist.

Paradoxically, "good enough" is *not* good enough at Paranite, for since the company was founded 66 years ago, it has been motivated by the desire to make a better product each day than the day before, if humanly possible. This became a habit, then a tradition, and today is the *invisible ingredient*.

Growing aware of the excellence of product that this "invisible ingredient" made possible, wholesalers and contractors coined a phrase decades ago expressing their confidence in Paranite: "If It's Paranite, It's Right." In the course of time, the company adopted this trade phrase as its slogan.

True in past years—more true today! The "invisible ingredient" still silently assures you that every foot of Paranite Wire and Cable is as nearly perfect as human hands can make it . . . utilizing modern equipment and cautious testing.



From POWER CABLE to FIXTURE WIRE . . . **you'll find Paranite quality high . . . service outstanding!**

PARANITE WIRE AND CABLE

DIVISION ESSEX WIRE CORPORATION

Factory: Anaheim, California

Warehouses* and Sales Offices

***LOS ANGELES, 6415 East Fleet Street; *SAN FRANCISCO, 1077 Howard Street**
***PORTLAND, 525 North Tillamook Street; SEATTLE, 444 Dexter Horton Building**

DISTRIBUTION TRANSFORMERS

THIS CORE AND COIL

COULD SAVE YOU...$88

Estimate your possible savings in terms of all transformers on your lines

Buying a new self-protected 5-kva 7200-volt transformer with taps, two bushings, and two arresters, breaker and signal light, costs about $190. A General Electric Service Shop, however, can replace your burned-out core and coil with a new core and coil, new fuses, and new oil for about $102. You save about $88 and get a new-transformer warranty.

G.E.'s uprating service can also save you money. In addition to simply replacing burned-out cores and coils, your G-E Service Shop can uprate old and burned-out transformers both in kva and voltage, and can also convert conventional-type units to self-protected units if you wish. A conventional 1½- or 3-kva, 2400-volt transformer, for example, can usually be uprated to 5 kva, and a 5-kva unit to 7½ or 10 kva, either 7200 or 7620 volts, and converted to a self-protected type. Both routine rebuilding and emergency repairs are as near as your telephone—there are 34 G-E service shops in major cities.

Look at the other money-saving features that prove "all transformers are not alike": **Impulse testing,** for instance, saves years of transformer life. **One-piece clamping bands** save maintenance time. Re-usable **Nitrile rubber gaskets** help save units from contamination. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Strenicor terminal clamps** save terminals from breaking. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense.

For the complete story, contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Section 431–40, Schenectady 5, N. Y.

dollar-saving features prove ATANA*

***ALL TRANSFORMERS ARE NOT ALIKE**
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

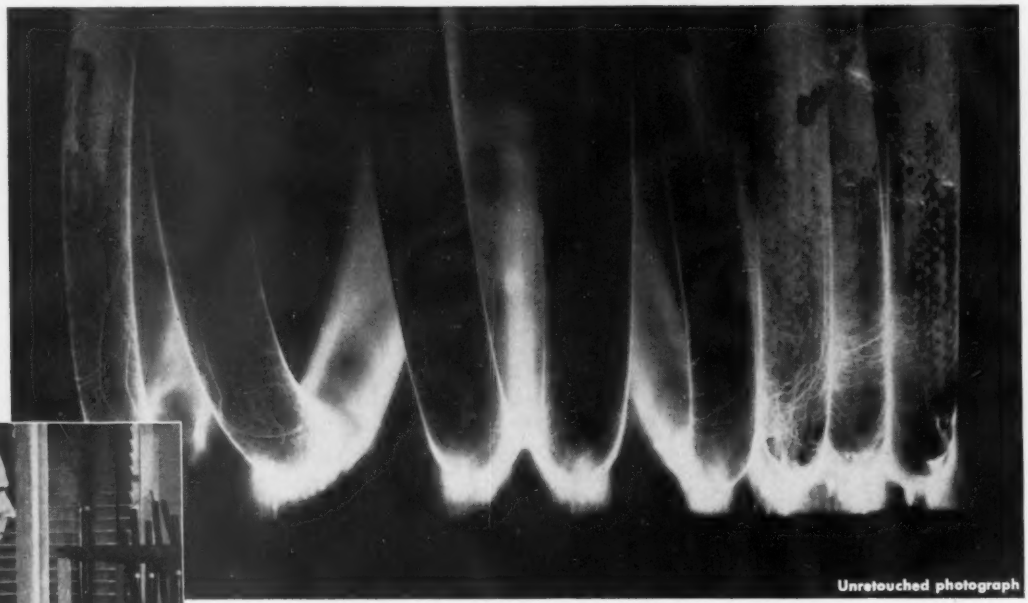
Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

US RUBBER

GRIZZLY® POWER CABLES



Unretouched photograph

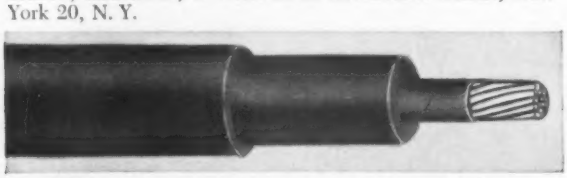
Under High Ozone Attack resulting from excessive voltage outlast 9 other leading brands tested!

In United States Rubber Company's special wire and cable testing laboratory, scientific devices record how cables react under abnormally high voltage.

In this test, 6 samples of 5 KV unshielded U. S. Grizzly Power Cables were pitted against 26 other 5 KV samples made by 9 leading competitors. Lengths were bent into U-shapes, roughly 8 times the cable's over-all diameter. They were then placed upright on a grounded metal plate with bottom of "U" resting on plate. Then a conductor-to-plate potential of 40,000 volts was applied. The test was allowed to run until all cables failed, with elapsed time to failure carefully checked for each. The accompanying chart shows dramatically the overwhelming superiority of U. S. Grizzly Power Cable.

U. S. Grizzly Power Cables are obtainable at your "U.S." branch, distributor, or write us at Rockefeller Center, New York 20, N. Y.

Manufacturer	No. of samples tested	Elapsed time to failure—in hrs. Lowest value	Highest value
"U.S."	6	2941	6030
A	2	0	3
B	5	0	92
C	2	0	.6
D	3	12.5	144
E	3	300	490
F	2	30	46
G	6	.1	2509
H	2	0	0
I	1	25	25



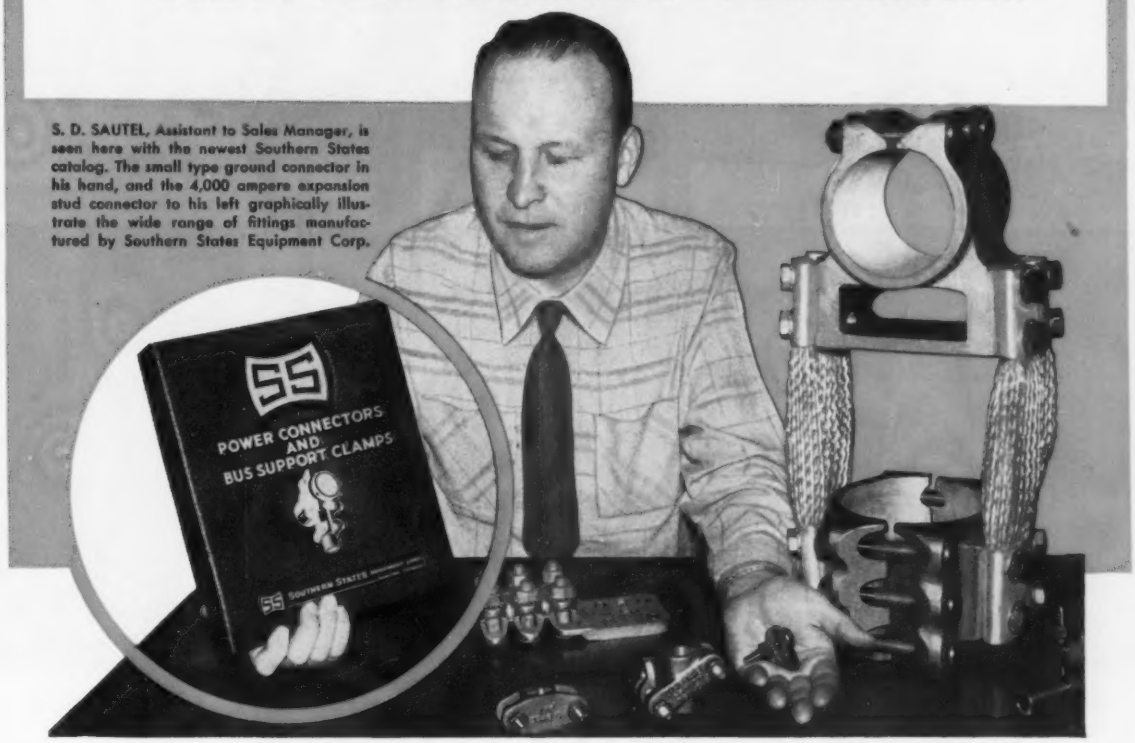
US RUBBER

Electrical Wire & Cable Department

United States Rubber

THIS CATALOG CONTAINS

THE POWER CONNECTORS AND BUS SUPPORTS NEEDED FROM GENERATION TO DISTRIBUTION



S. D. SAUTEL, Assistant to Sales Manager, is seen here with the newest Southern States catalog. The small type ground connector in his hand, and the 4,000 ampere expansion stud connector to his left graphically illustrate the wide range of fittings manufactured by Southern States Equipment Corp.

Three years ago Southern States began an extensive program of re-designing and expanding its line of power connectors and bus support clamps. Ears were strengthened and weights increased 40% to 50%.

The result is a line of rugged fittings in a full range of sizes and types. You can choose a suitable Southern States connector for application on your system for practically any requirement . . . from the generating station to the distribution system.

The complete line is included in the new Southern States catalog, which is fully illustrated and indexed to make it easy to find the exact fitting required for any application.

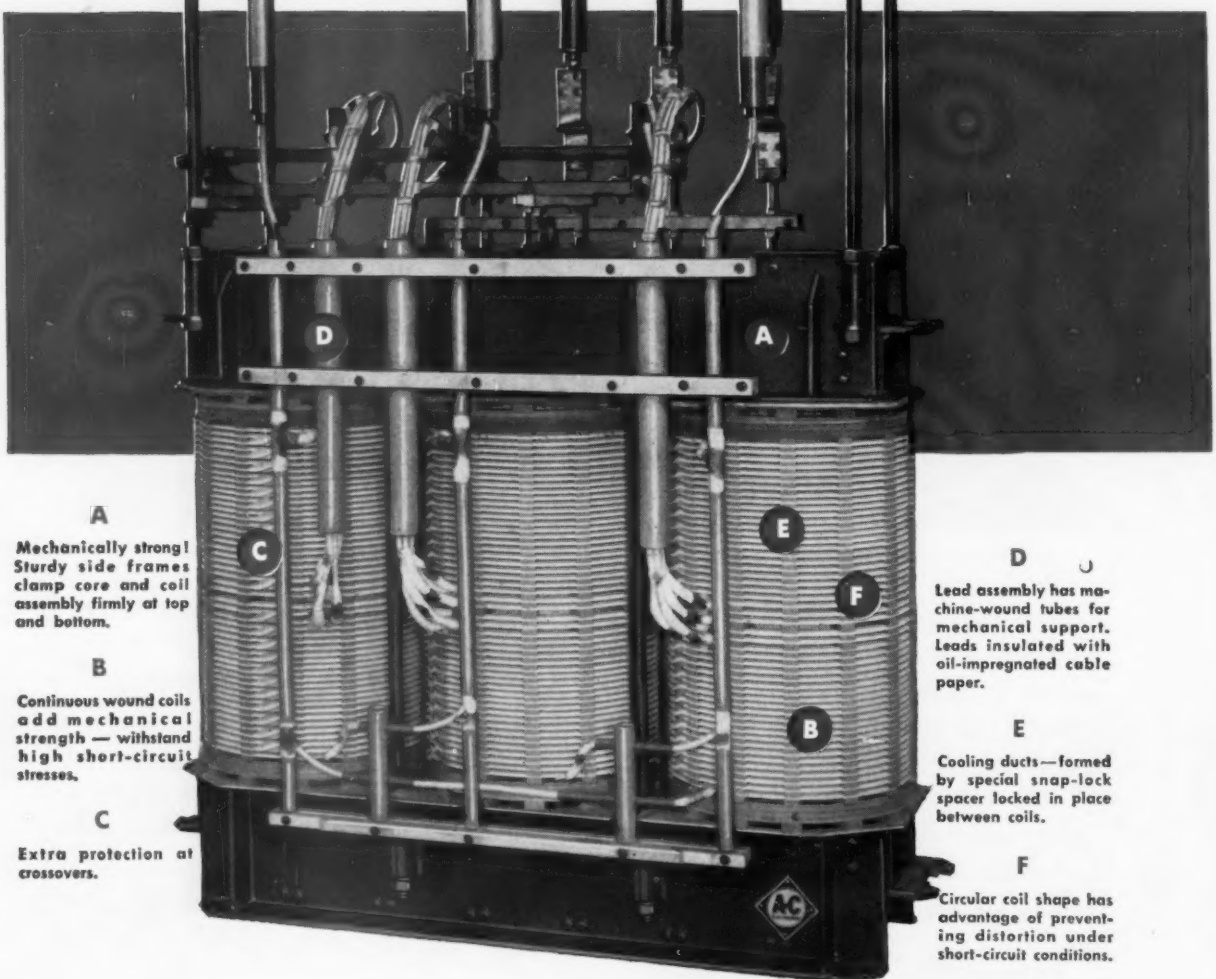
If you have not yet received your copy and could use one, see your Southern States representative or write direct for Catalog No. 526.

SOUTHERN STATES EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

How

ALLIS-CHALMERS
Power
Transformers



A

Mechanically strong! Sturdy side frames clamp core and coil assembly firmly at top and bottom.

B

Continuous wound coils add mechanical strength — withstand high short-circuit stresses.

C

Extra protection at crossovers.

D

Lead assembly has machine-wound tubes for mechanical support. Leads insulated with oil-impregnated cable paper.

E

Cooling ducts—formed by special snap-lock spacer locked in place between coils.

F

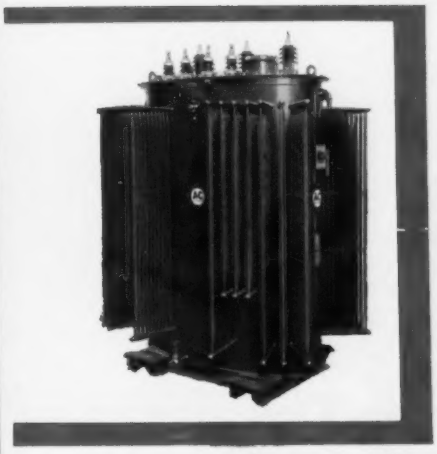
Circular coil shape has advantage of preventing distortion under short-circuit conditions.

A-C ALLIS-CHALMERS

ALLIS-

Balanced Design Works for You

Here's a combination of design features that adds up to *balanced design*... long transformer life



No single feature is all-important in transformers! But together they mean *balanced design* — all the things you want and need in a transformer.

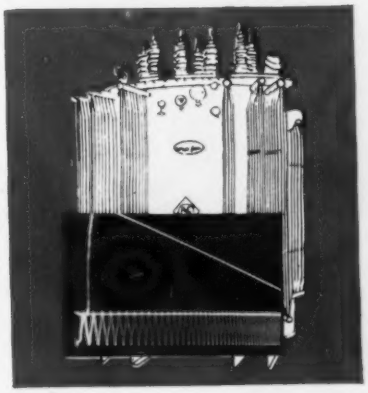
- **High impulse strength**
- **Corona-free construction**
- **Quiet operation**
- **Reduced size and weight**
- **Dependable performance**
- **High short-circuit strength**
- **Rugged mechanical construction**

In balanced design, every feature must contribute its full share to the operation. No feature can outweigh another — each must complement the other.

For example — of what value is "light weight" if it cuts performance? With balanced design you get both light weight *and* efficient performance.

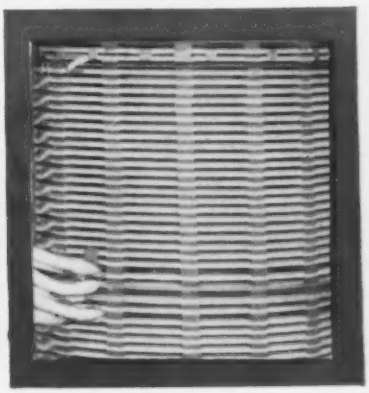
Get complete information. Call your nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Three features of balanced design



1. Corona-free design. Repeated lightning and switching voltage surges may be applied to the transformer without damage, up to full values as defined by standards.

2. Reduced size and weight. This means higher rated transformers are easier to handle — can be moved without removing radiators and bushings.



3. Proper coil design plus static shields and interleaved coils where needed provides high series capacitance, as well as more uniform voltage distribution.

CHALMERS A-4955

new!

Sleet Hood, protective cover for silver plated phosphor bronze contact spring and guide plate. Closure and contact are simple and positive. Unaffected by weather. Hubbard design of guide plate and contact spring assures perfect closure action.

Complete terminal protection is provided by flexible snap-on bird guard through which a "lift" ring projects. Line attachment is by means of transformer type connector. Conductor may be snubbed through "lift" ring opening if desired.

New style, extra strong, insulated mounting bracket. Coating provides bird and animal protection.

Specially designed small bore fuse tube for high pressure instantaneous single vent expulsion. Fibreglass reinforcement provides mechanical strength to handle maximum current interruption, with no increase in bore diameter—and no destructive results.

Load break fitting attachment holes—Load break fittings provide means for mechanically disrupting connection. Furnished extra.

Cam locking device which permits unobstructed removal of fuse holder when in the open position, in addition to locking holder against accidental removal the instant closure is begun. Spring actuated leverage arrangement puts tension on fuse link to aid in quick opening.

Locked recoil absorber bracket is provided to cushion recoil of discharge action. This prevents damage to the porcelain and mechanical assembly under stress of maximum current interruptions.

Hubbard Distribution Fuse Cutout!

Exclusive small-bore fibreglass reinforced fuse tube design increases operating ranges

Now from Hubbard a new heavy-duty fuse cutout that opens a new era in the protection of equipment on your distribution lines. Incorporating new electrical and mechanical designs, the new Hubbard Cutout offers tremendous operational flexibility with its ability to clear faults over the entire operating range from minimum to maximum available fault current. No longer will it be necessary to continually check available fault current values at many different points as your system is expanded. What's more, the need for shifting cutouts to handle changing fault current values will be drastically reduced.

Heart of the new design is the small bore fibreglass reinforced, single vented fuse tube. By using a minimum inner diameter fuse tube and reinforcing it with fibreglass for maximum mechanical strength, Hubbard engineers were able to provide the positive expulsion action necessary for safe, sure, instantaneous arc interruption.

To support this greatly increased bursting action, entirely new high strength mechanical components were provided. There are no unnecessary or complicated parts in this new rugged simple design. Gas expulsion and fuse blowing are substantially completed before any parting of current carrying contacts. The entire current carrying circuit is composed of silver plated contacts of the pressure type. All springs are designed to act well below their elastic limits for maximum pressure maintenance throughout the life of the cutout. Positive closing is assured through the cam arrangement of the hinge mechanism which causes the fuse tube hinge to tighten as the fuse approaches the latched position.

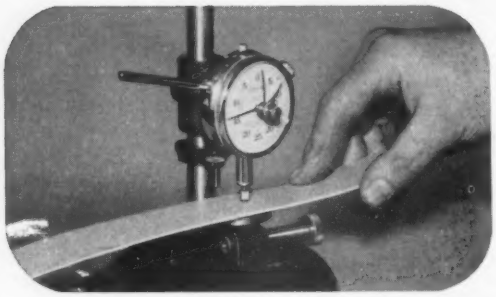
Equipped with sleet, bird proofing and dead-end eye to meet local service conditions. Mechanical load break attachment can be specified as needed. Your Hubbard distributor will be glad to supply you with production samples. Call him today, or write for a copy of Bulletin 756.

HUBBARD AND COMPANY

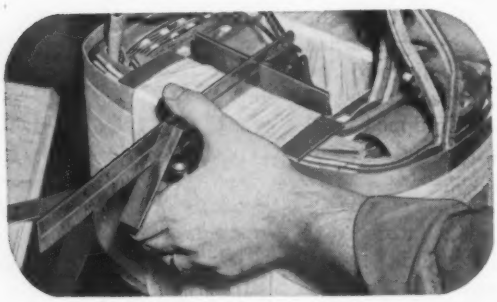
Pittsburgh 1, Pa.
Chicago 50, Ill.
Oakland 8, Calif.
Dallas (Plano), Texas

"Here's how every Kuhlman transformer gets 5 thorough quality checks before it's released for shipment..."

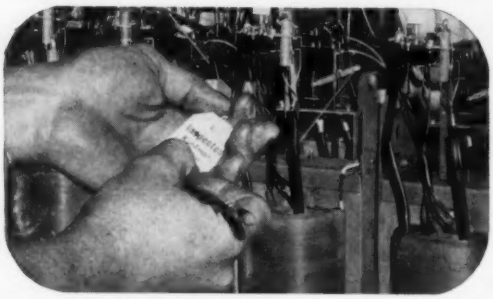
G. W. Miller
Supervisor of Quality Control



INCOMING MATERIALS CHECK—first step in maintaining traditional Kuhlman quality. All raw materials are carefully checked, upon arrival, against quality standards and original ordering specifications.



FABRICATION CHECK—many individual quality checks occur during fabrication. Photo shows coil being measured for dimensional accuracy. Tanks and cores receive similar rigid checks.



ASSEMBLY CHECK—as every Kuhlman transformer is assembled, there are scores of checks on clearances, connections and general construction. OK tag must be on every unit before it can be tanked.

LINE CHECK—double checking is required on Kuhlman's production lines. Here, complete and final checks are made of all construction, bushings, adjustments and connections before tank cover goes on.

FINAL CHECK—completing the cycle of 5 quality checks, final inspection is made on paint, gap settings, nameplate, accessories and other specifications. Only then is a Kuhlman transformer OK'd for shipment.

KUHLMAN
ELECTRIC COMPANY

5613

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

DISTRIBUTED BY MAYDWELL & HARTZELL, INC. Seattle • Spokane • Portland • San Francisco • Los Angeles • San Diego • Phoenix

4 WAYS TO ILLUMINATING SAVINGS

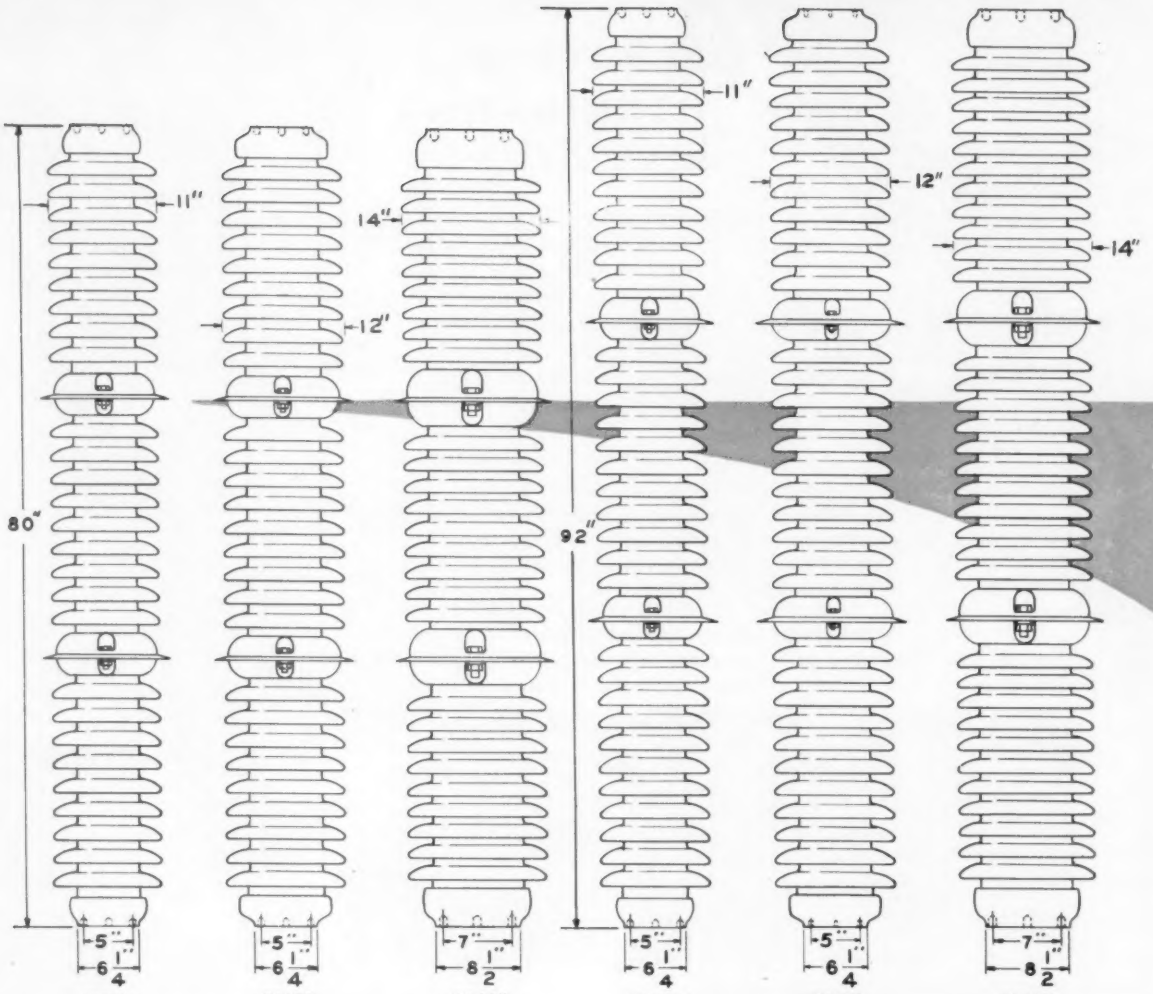
Specify Sunbeam Lighting Visionaires® as your first step to achieving quality illumination. Accept no "equals" — there are none. Plan lighting to make use of Visionaire® ease of installation and extreme versatility. Over 100 basic types are available to meet any installation condition, including modern suspended grid and T-Bar ceiling systems. Look beyond initial costs and evaluate your decision in terms of long-range savings. Quality construction, heavy gauge bodies, durable components, contemporary design and lasting finishes all are synonymous with the Sunbeam Visionaire® symbol. And finally, look for the Bonderite and U.L. labels assuring lifetime corrosion-resistant finishes and highest standards of construction, design and performance.

Shown: An installation of HPLM5600 series troffers with hinged, single element, miniature cell plastic louvers recessed in a snap-in type T-Bar ceiling system, integrated with heating, air conditioning and acoustical tile panels of the ceiling itself.

SUNBEAM visionaire LIGHTING COMPANY

SUNBEAM LIGHTING COMPANY

777 East 14th Place, Los Angeles 21, California



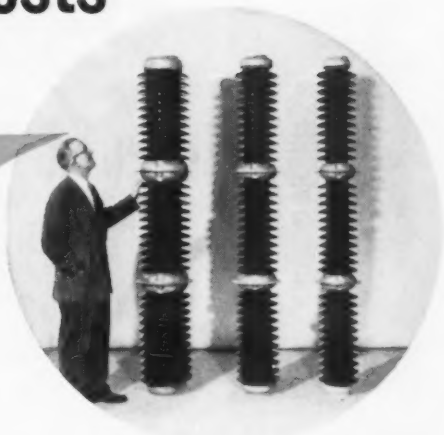
50742 51688 51202 50637 50439 51689

Catalog Number	50742	51688	51202	50637	50439	51689
Voltage Rating, Kv	196/230	196/230	196/230	230/287	230/287	230/287
Cantilever Strength, lbs.	910	1450	2750	750	1170	2300
Tension Strength, lbs.	20,000	25,000	40,000	20,000	25,000	40,000
Torsion Strength, inch-lbs.	40,000	90,000	120,000	40,000	90,000	120,000
Compression Strength, lbs.	60,000	75,000	100,000	60,000	75,000	100,000
60-Cycle Dry FO, Kv	575	575	575	660	660	660
60-cycle Wet FO, Kv	475	475	475	570	570	570
Impulse Flashover, Kv Pos.	1010	1010	1010	1210	1210	1210
Impulse Flashover, Kv Neg.	1240	1240	1240	1450	1450	1450
60-cycle Withstand, Kv Dry	465	465	465	545	545	545
60-cycle Withstand, Kv Wet	385	385	385	455	455	455
Impulse Withstand, Kv	900	900	900	1050	1050	1050
Test Voltage, Radio Infl.	125	125	125	146	146	146
Maximum RIV, Microvolts	500	500	500	500	500	500
Leakage Distance, in.	165	165	165	198	198	198
Dry Arcing Distance, in.	64	64	64	76	76	76
Net Weight, lbs.	310	370	580	360	430	645

ANNOUNCING

Lapp 230 Kv Station Posts

IN 3 STRENGTH RATINGS ...IN 2 BIL WITHSTAND RATINGS



To designers of stations at 230 Kv, Lapp offers its proved Station Post in two BIL series . . . 900 Kv withstand and 1050 Kv withstand . . . in standard strength, high strength, and in new extra-high strength that possess cantilever values greater than those of any switch and bus insulators ever offered before at this voltage.

EASIER, FASTER TO INSTALL Lapp high-voltage Station Posts cost less to assemble and handle than do conventional pin-cap stacks for switch and bus use. They weigh less and are composed of fewer sections. Stack for stack, a comparison with available conventional station insulators shows the Lapp Station Posts to be approximately 30% lighter in weight.

All Lapp 230 Kv Station Posts consist of three sections, each with caps cemented at the ends, and bolted together with four hex-head bolts. A total of eight bolts completes the assembly. End caps have standard bolt circles, require no sub-bases, spacers or adapters.

LAPP POSTS ARE *STIFFER* The Lapp Station Post unit is a one-piece porcelain post with caps cemented at the ends in large area, low tension compression grip . . . as compared to the nested porcelain shells and internal pin of conventional stacking units. Under cantilever load, deflection of Lapp Posts is considerably less than that of conventional pin-cap insulators; laboratory measurement shows the reduction in deflection to be approximately 50%. This increase in rigidity overcomes the serious problem of switch alignment commonly encountered by operators of 230 Kv substations.

STATION POST PERFORMANCE In addition, these insulators provide all the well-known advantages of Lapp Station Post design . . . porcelain cracking or puncture is eliminated because the hardware is on the outside . . . freedom from radio interference without need for conductive coatings . . . better service and lower maintenance cost under dirt conditions . . . greater resistance to arcover and mechanical attack.

Lapp

At 230 Kv too, Lapp Station Posts provide an *extra* margin of operating security, low upkeep and long life.

Lapp Insulator Co., Inc., Le Roy, N. Y.

WESTERN REPRESENTATIVES:
Los Angeles: Earl S. Condon Co.
San Francisco: C. E. Ingalls & Sons
Seattle: Charles F. James
Butte: R. E. McDonough Co.
Salt Lake City: Riter Engineering Co.

NOW!

3 new SCOTCHCAST BRAND kits for cable splicing!

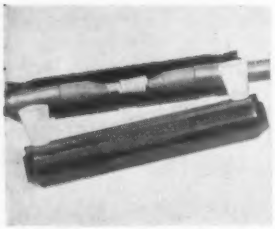
Reg. U.S. Pat. Off.

Here is everything you need to make a splice and insulate it on any single-conductor cable up to 600,000 CM . . . quickly, easily with "factory-tight" efficiency – and it's all in kit form!

The new "SCOTCHCAST" Brand 82-A1, A2 and A3 kits (for different sized straight-line splices) and 90-B1 kit (for wye and tap splices) utilize "SCOTCHCAST" Resin No. 4 in the famous ready-to-use "Unipak" container. "SCOTCHCAST" Resin effectively blocks all possible moisture entry points; gives you maximum insulation and protection against mechanical and electrical stresses on every splice.

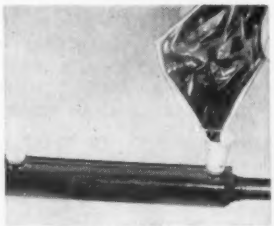
All materials for this revolutionary non-technical splicing method are included in the "SCOTCHCAST" kit. SEND FOR NEW FREE BOOKLET describing the "SCOTCHCAST" kits in detail. Just write on your letterhead to Minnesota Mining and Manufacturing Company, St. Paul 6, Minnesota, Dept. BU-86 Do it today!

Three easy steps...and a completed splice!

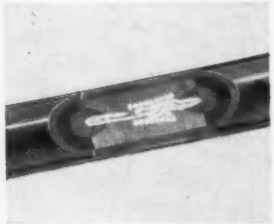


1 Cable is spliced and mold-halves are assembled over splice area. Kit contains all necessary materials.

2 Remove "Unipak" container from foil envelope; squeeze the bag to activate the "SCOTCHCAST" Resin.



3 Pour activated "SCOTCHCAST" into mold, using pouring spouts supplied with kit. Resin begins to set immediately.



4 Cut-away photo shows how tightly splice is sealed – the "SCOTCHCAST" way – against any moisture penetration.

The term "SCOTCHCAST" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P. O. Box 757, London, Ontario.

these 2 words
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With the name CLIFTON on your Conduit there's no need to look further, for CLIFTON means superiority in every way. Careful manufacture by CLIFTON's special hot dip method gives double the zinc protection of ordinary conduit, both inside and outside. Using CLIFTON Rigid or E.M.T. Conduit adds that extra bit of integrity to every job you do. As contractors everywhere are doing every day . . . Specify CLIFTON Conduit.

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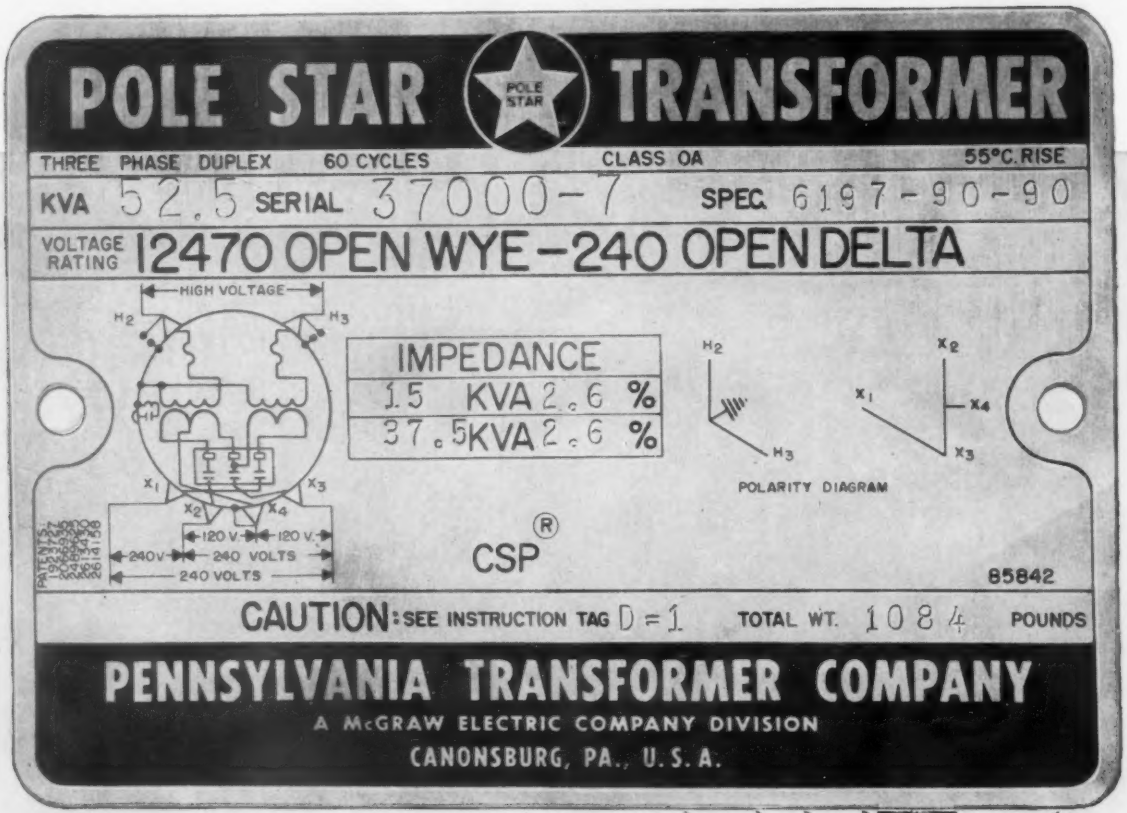
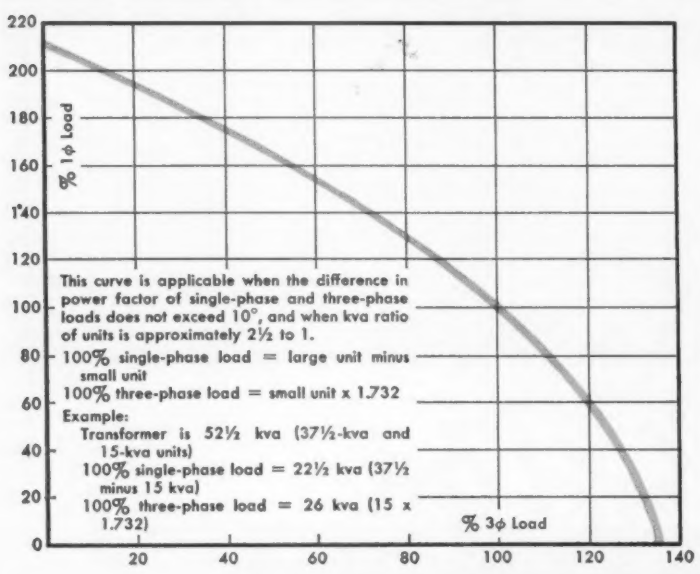
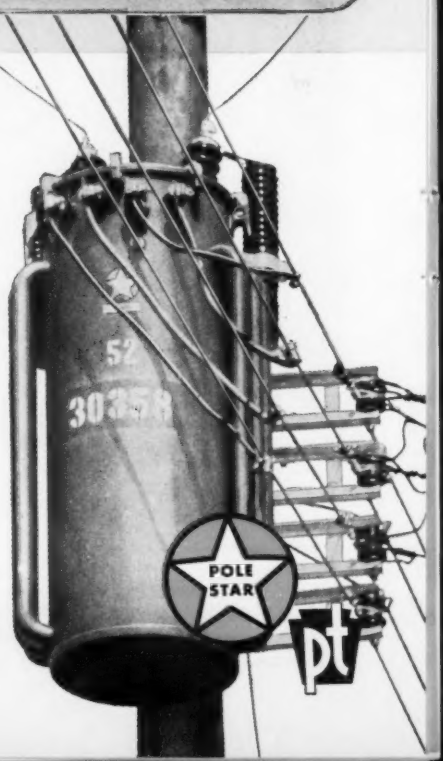
WIRE — CABLE — RIGID CONDUIT — ELECTRIC METALLIC TUBING — CLIFTALL UF

Announcing the NEW







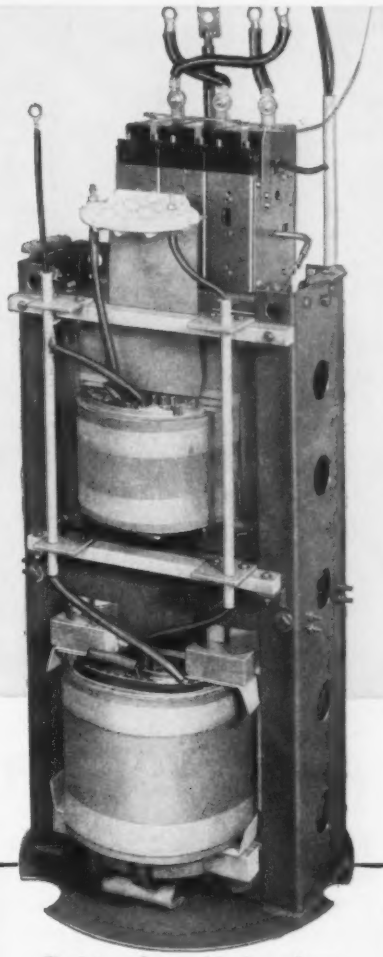
POLE STAR® DUPLEX TRANSFORMER

for Simultaneous Single- and Three-Phase Service from a Single Pole-Mounted Transformer

Pennsylvania's new Pole Star Duplex Transformers provide an efficient, economical answer wherever multiphase service is required from pole-mounted transformers. This is especially true in areas where three-phase air conditioners are used. By eliminating the need for banks of two or three units, Pole Star Duplexes simplify installation . . . lower initial costs. Mounted directly to the pole, the new duplexes require no extra cross-arms . . . make a neater appearance than do banks of transformers.

Pole Star Duplex Transformers are composed of two standard core-and-coil units mounted in a single tank — the most common combination being 37½ and 15-kva units to provide a total capacity of 52½ kva. The units are connected in open wye, open delta as shown on the opposite page, and may be equipped with CSP protective equipment.

Like all other Pole Stars, the new duplex transformers feature Pennsylvania's patented lap-on-top core. Thus, you can solve multiphase power problems and also get the low exciting current and low core loss for which Pole Stars are noted.



The internal assembly shown here is a 52½-kva Pole Star Duplex, formed by combining 37½-kva and 15-kva units. Other available ratings are: 20 kva (15 and 5 kva) . . . 35 kva (25 and 10 kva) . . . 40 kva (25 and 15 kva) . . . 62½ kva (37½ and 25 kva).

A Southwestern Utility Writes of These "Distinct Advantages" of Duplex Installations

1. "Their appearance is better. This becomes more and more important as the rapid increase in three-phase residential load requires more transformer installations very close together.
2. "In the event of trouble or overload on the secondary, all three phases will be interrupted by the CSP breaker*, not permitting single phasing due to secondary trouble.
3. "May be more readily installed on existing poles.
4. "More adaptable for use on poles where secondaries are dead-ended.
5. "Heat dissipation of large tank, common to both single-phase units, permits greater flexibility in overloading one or the other of the single-phase units."

**Pole Star Duplex Transformers are available either with or without CSP protective equipment.*

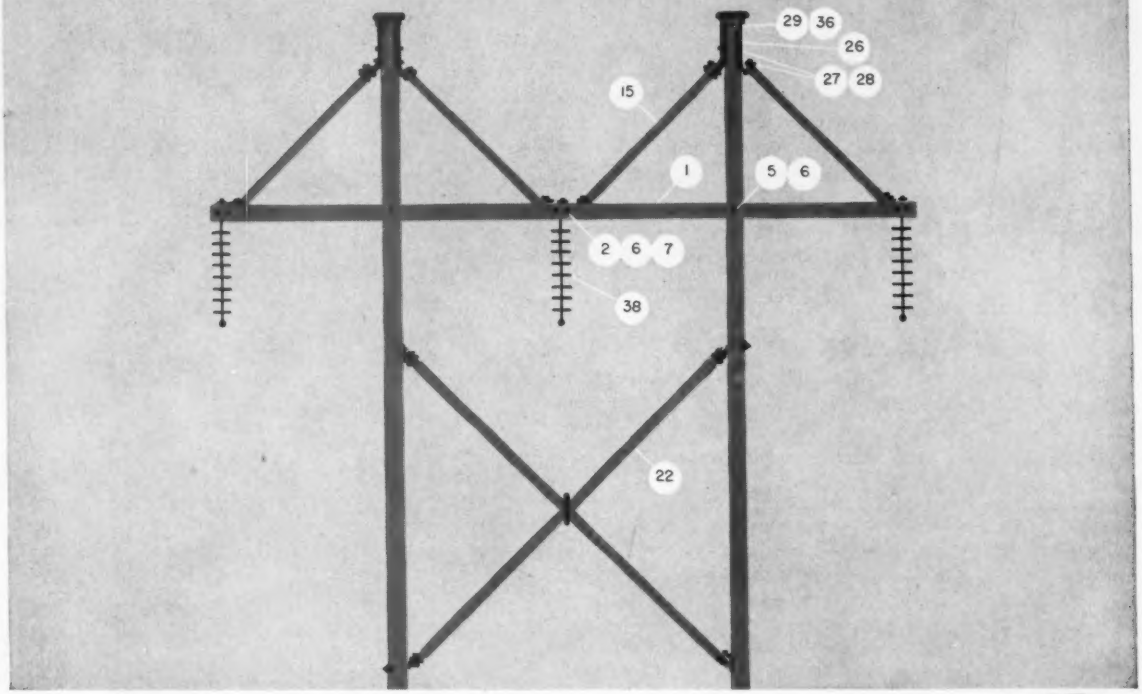
PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

TANGENT W/BRACES NO. 702

H-FRAME STRUCTURE, DOUBLE PLANK CROSSARMS WITH METAL SPACERS, POLE TOP STATIC WIRE SUPPORTS, AND WOOD CROSS BRACES DESIGNED FOR 69 TO 154 KV CONSTRUCTION

DRG. REF. #	QUANTITY	DESCRIPTION	DRG. REF. #	QUANTITY	DESCRIPTION
792	2	Pole	15	4	Vee brace 3⅜" x 4⅜" cross section
1	2	Crossarm	22	1 set	Cross brace w/fittings, clamp, ⅞" pole bolts and curved washers
2	3	Steel spacer fitting w/mounting bolts	26	2	Static wire support
5	2	Stud bolt ⅞" w/washer nuts	27	4	Machine bolt ¾"
6	8	MF locknut ⅞"	28	4	MF locknut ¾"
7	1	Bent stud bolt ⅞" x 8" w/2 sq. nuts	29	2	Clevis
			36	2	Suspension clamp for static wire
7	2	Bent bolt ⅞" x 5½" w/sq. nut	38	As required	Suspension insulators and fittings



SIMPLIFY YOUR POLE LINE PROJECTS . . .

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The combination of top quality materials and specialized Graybar service can make a substantial contribution to simplifying your pole line projects. For example, take the structure illustrated here.

These complete cross-arm units are fabricated and fitted with hardware according to *your* specifications. Every pre-bored member fits perfectly. You reduce time consumed and cost of field assembly. You can plan on a far more smoother, efficient operation and completing the job on schedule.

Need assistance in solving tough or unusual problems? In addition to our regular service, Graybar Outside Construction specialists and field representatives are always ready to share with you their specialized knowledge.

For assistance, advice, complete quotations and the quality materials that assure uninterrupted service to your customers, make your next transmission or pole line order read "via Graybar".

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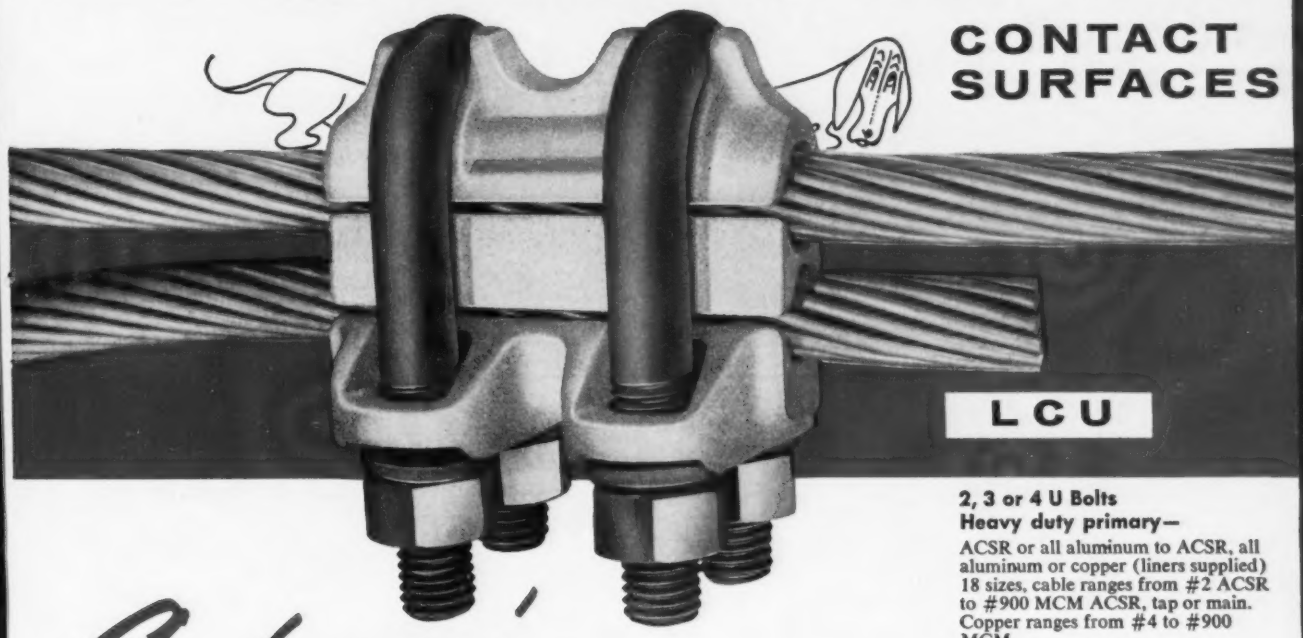

2, 3 or 4 U Bolts
Heavy duty primary—
ACSR or all aluminum to ACSR, all aluminum or copper (liners supplied) 18 sizes, cable ranges from #2 ACSR to #900 MCM ACSR, tap or main. Copper ranges from #4 to #900 MCM.

Andersons' U-BOLT CONNECTORS

LCA

General primary—
ACSR or all aluminum to ACSR or aluminum. 14 sizes, cable ranges from #4 to #397.5 MCM ACSR, tap or main.

LCC

General primary—
ACSR or all aluminum to copper (liners supplied). 21 sizes, cable ranges from #4 ACSR to #636 MCM ACSR. Copper ranges from #8 to #500 MCM.

- ★ Flared cable openings assure non-cutting or nicking of conductors!
- ★ All aluminum construction for equal thermal coefficients of expansion for aluminum to aluminum cable!
- ★ High conductivity center spacer for low contact resistance and cable protection.
- ★ Greater individual connector cable ranges simplifies stocking

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ANDERSON ELECTRIC CORPORATION*

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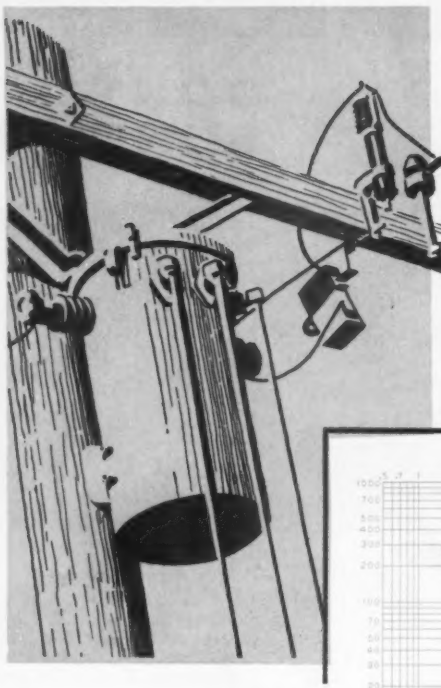
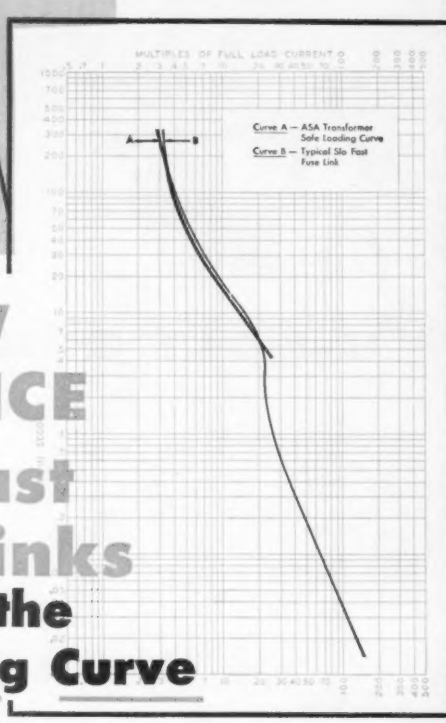
**Formerly Anderson Brass Works, Inc.*



NOW...

full overload capacity transformer protection

without unnecessary outages



NEW CHANCE SloFast Fuse Links

follow the Safe Loading Curve

DUAL ELEMENT

SLOW

FAST

The Chance SloFast Fuse Link has two distinct current responsive elements: A slow element, made up primarily of a heater coil and soldered junction with insulated strain pin and ceramic tube; and a fast element constructed like the single element in a conventional fuse link.

This exclusive Chance development gives more accurate, more positive overload capacity protection for distribution transformers than you could ever before obtain.

New Chance SloFast Fuse Links offer 3 advantages over the conventional type: full use of available transformer overload capacity without reducing transformer life . . . virtual elimination of transformer "burn-outs" due to overloads and secondary faults . . . increased continuity of service to your customers.

These fuse links are available in both universal buttonhead and open link styles in a complete range of sizes from 0.2 to 10.4 amps inclusive. All SloFast Fuse Links have ampere ratings identical with the full load ratings of the transformers they are designed to protect. Each fuse link comes in an individual container clearly labeled to show rating. Chance SloFast Fuse Links are sold by leading Electrical Wholesalers everywhere.

Write to A. B. Chance Company, Centralia, Mo., for new bulletin "FUSE LINKS AND HOW TO USE THEM." It contains performance curves and application tables for all distribution voltages.

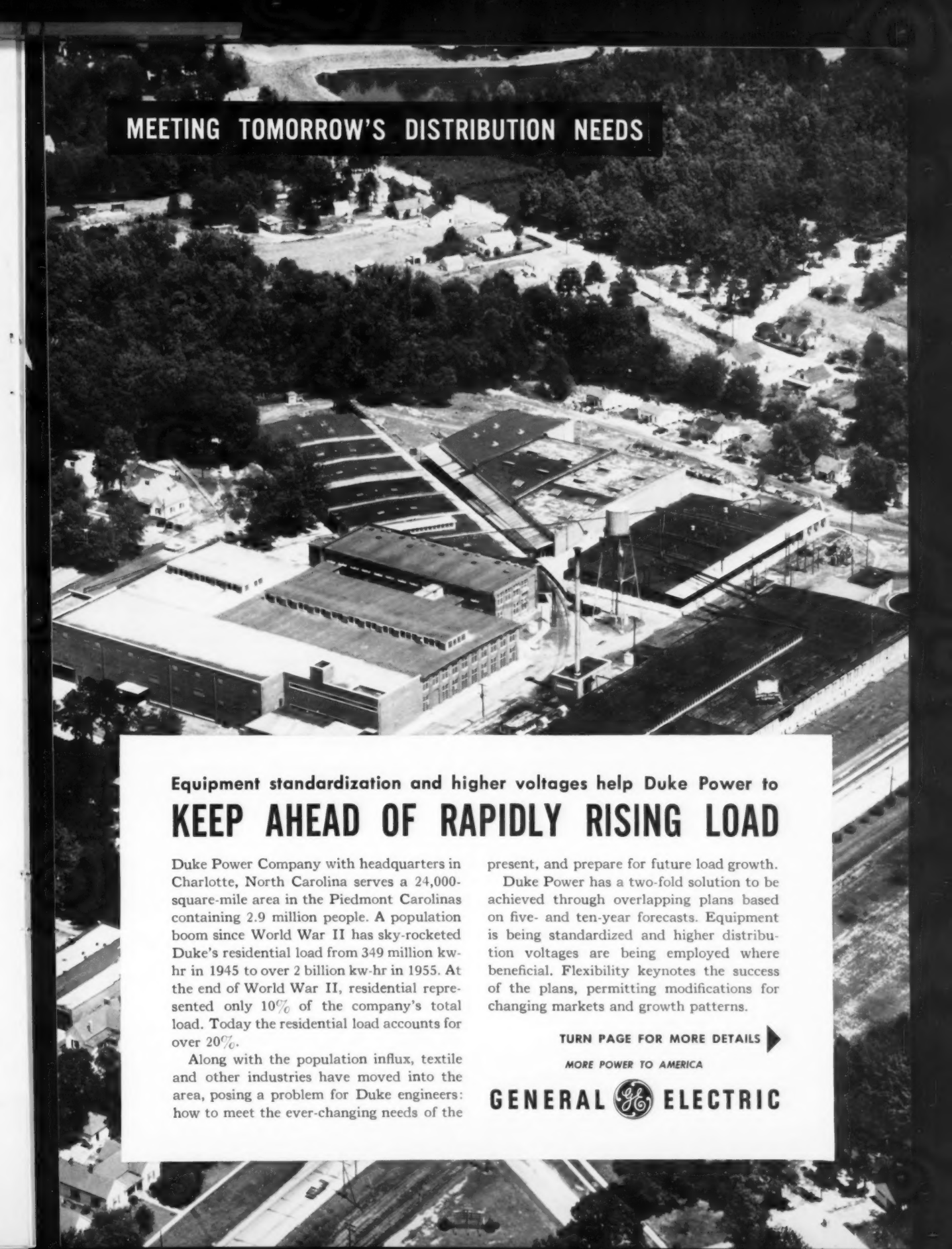
PACKAGED FOR EASY REMOVAL

Linemen can remove links from containers without removing their gloves. A slight, firm twist separates the unit container from the 5-unit container. The end of each unit container is perforated for quick removal of the link.

A·B·CHANCE CO·

ABC INDUSTRIES

CF56-20



Equipment standardization and higher voltages help Duke Power to

KEEP AHEAD OF RAPIDLY RISING LOAD

Duke Power Company with headquarters in Charlotte, North Carolina serves a 24,000-square-mile area in the Piedmont Carolinas containing 2.9 million people. A population boom since World War II has sky-rocketed Duke's residential load from 349 million kw-hr in 1945 to over 2 billion kw-hr in 1955. At the end of World War II, residential represented only 10% of the company's total load. Today the residential load accounts for over 20%.

Along with the population influx, textile and other industries have moved into the area, posing a problem for Duke engineers: how to meet the ever-changing needs of the present, and prepare for future load growth.

Duke Power has a two-fold solution to be achieved through overlapping plans based on five- and ten-year forecasts. Equipment is being standardized and higher distribution voltages are being employed where beneficial. Flexibility keynotes the success of the plans, permitting modifications for changing markets and growth patterns.

TURN PAGE FOR MORE DETAILS ▶

MORE POWER TO AMERICA

GENERAL ELECTRIC

MEETING TOMORROW'S DISTRIBUTION NEEDS

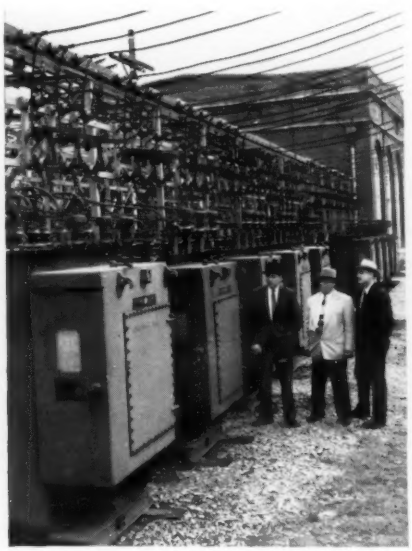
Duke Power

CO-OPERATIVE TEST by Duke Power and General Electric has been conducted for over a year on this 240-v, 5%, 3-kvar series capacitor designed for application in the primary neutral of a 15-kva distribution transformer. P. D. Huff of Duke Power, l., and J. P. Ruddell of General Electric discuss test.

GREATER SYSTEM FLEXIBILITY, lower-cost future expansion are assured in Charlotte, by G-E network transformers connected for 277/480Y spot network, one of several such installations. Discussing it (l. to r.): J. W. Foster, Duke; J. P. Ruddell, G.E.; F. W. Edwards, Duke; and J. R. Stevenson, G.E.

STREET LIGHTING in Duke Power's service area includes such examples of progressive community activity as these General Electric Form 400 luminaires which provide comfortable vision on Highway 21, Charlotte, North Carolina.

LONG LIFE, reliability, and minimum maintenance are features of I-55 meters. This meter test by J. R. Griggs of Duke Power is observed (l. to r.) by R. D. Hilley, G.E.; and J. J. Strickland of Duke.



EQUIPMENT RELIABILITY is shown by these General Electric step-voltage regulators, which have operated over 140,000 times each in 3½ years without excessive contact wear. (L. to r.) J. P. Ruddell, G.E.; G. T. Finger, Duke Distribution Engineer; S. W. Johnson, G.E.

streamlines its distribution system through five-year and ten-year plans

Standardization on General Electric equipment helps increase system flexibility

The rapid expansion of textile mills in the Piedmont Carolinas—Duke Power's service area—has increased the need for considerably more electric power over a relatively short period of time. Much of it must be distributed over rugged terrain and hilly countryside, making equipment reliability of paramount importance. And, modern textile mills with integrated operations have exacting requirements.

Duke Power engineers, calculating on the basis of five- and ten-year forecasts, programmed a transition to standardized equipment for economy. They are also increasing voltages from 2400/4160 to 7200/12470, and in some areas 14400/24900Y, for improved system regulation and increased flexibility.

DISTRIBUTION SYSTEM COMMITTEE for Duke Power sits in session regularly at Charlotte, N. C. to discuss present problems and future planning—an interplay of ideas resulting in creative approaches. Here, P. A. Fry points out advantages of using reclosers. Seated at his right is Chairman C. B. Miller, Assistant Supervisor of Branches.

Typical of Duke Power's progressive attitude is the co-operative test with General Electric of a 240-v, 5 per cent series capacitor designed for application in the primary neutral of a 15-kva distribution transformer. This effort to achieve approximate self voltage regulation of individual transformers serving low-power-factor air-conditioning loads is a good example of searching out the advantages of new apparatus and the guidance of General Electric application engineers.

When you specify General Electric, you take advantage of the latest advances in apparatus design, construction and application. That's because General Electric engineers are trained to translate the trends and needs of growing systems as reported by field personnel, incorporate newest materials and manufacturing techniques in producing them, and provide help in putting these advances to best possible use on your system.

And to help utilities keep service running smoothly, highly trained General Electric service engineers plus a nation-wide network of Service Shops stand ready to meet any and all maintenance and repair needs—day and night.

For full information on distribution equipment and distribution system services, contact your nearby General Electric Apparatus Sales Representative, authorized Agent, or Distributor today. General Electric Company, Schenectady 5, N. Y. 303-2

TURN PAGE FOR MORE ON MEETING TOMORROW'S DISTRIBUTION NEEDS ▶

MORE POWER TO AMERICA

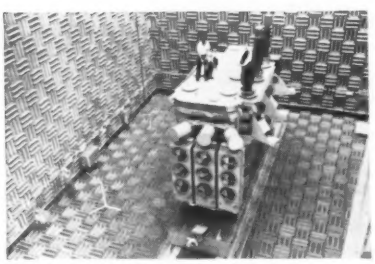
GENERAL ELECTRIC

ASSISTANCE FOR UTILITY ENGINEERS is provided by local application engineers. They spur use of latest ideas, product advances, help with system designs and equipment selection. These engineers are analyzing a system design problem.

Constant exchange of advanced ideas helps

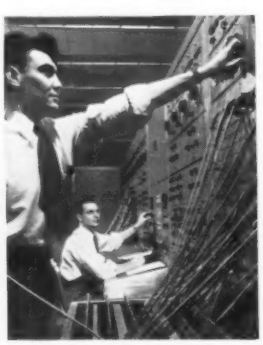
General Electric application engineers aid utilities with sound system planning

More reasons why it pays to see General Electric about your distribution problems



BETTER EQUIPMENT comes from continuing product development. Above, General Electric's $1,500,000 anechoic chamber is used to study power transformer noise.

GENERAL ELECTRIC INVITES utility engineers to study meetings, thereby helps them plan distribution systems and products. Interflow of ideas helps answer latest field problems.



ENGINEERING TRAINING includes Power Systems Course, Electric Utility Systems Course, board studies.

Duke Power is a typical case of cooperative engineering. General Electric application engineers worked closely with Duke Power engineers in planning network transformers in Charlotte, N. C. These transformers are now used in a 277/480-v spot network radial system. Future conversion to a network system—according to the dictates of load growth—will be less costly, as new load and new transformers can be added to a network system without making additional system studies.

The full range of General Electric's distribution system services includes headquarters system planners—district application and product engineers—extensive product development facilities—equipment installation and field service engineering—complete interflow of ideas. These services offer assurance of maximum operating continuity, on-the-spot application help, greater equipment efficiencies, valuable help in system design and techniques. Get the full story from your General Electric Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y. 303-2

LIVE BETTER ELECTRICALLY

MORE POWER TO AMERICA

GENERAL ELECTRIC

SIMPLE BUT EFFECTIVE

NEW PLP ZINC COW GUARD SOLVES BACK-SCRATCHING PROBLEM IN FARMER JONES' PASTURE

• Guy wires are good back-scratchers, but may cause trouble. Pedigreed cattle, with identification tags and chains, are apt to get snagged by clamps, loose "pigtails" of strand or in anchor loops.

This poses a problem in customer goodwill for the power company, a time-consuming headache for Farmer Jones, and discomfort for the cow.

Because Preformed Line Products Company manufactures PLP Guy-Grips*—the ultimate in guying efficiency, appearance and "streamlining"—the problem was brought to us. The answer: the new PLP Cow Guard, a heart-shaped zinc protector. It snaps easily into position, completely covers the loop of the Guy-Grip.

What's more, zinc contributes further to corrosion protection; not only for the guy assembly, but for the eye of the anchor rod. The resulting installation is simple, but effective.

The new zinc Cow Guard is only one example of PLP practical answers to realistic field problems. That's our business—progressive ideas, backed by creative engineering, laboratory and field testing. Together they spell better products. Why not call a PLP Representative today?

* *Made in accordance with or for use under one or more of the following U. S. Patents: 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.*

PLP

PREFORMED LINE PRODUCTS COMPANY

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TELEPHONE: CLEVELAND EXPRESS 1-3571

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PROTECTION OF WIRING

The only wiring system approved by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies is a standard-threaded rigid conduit.

Wherever electrical wiring must function safely and efficiently in hazardous locations, install Youngstown Buckeye rigid steel conduit. It is easy to bend . . . easy to fish wires through . . . and economical, because its greater corrosion resistance means a longer, trouble-free service life. When you install Buckeye you're one of thousands of contractors, owners and architects who make it one of the world's best known brands of standard-threaded, full-weight rigid steel conduit.

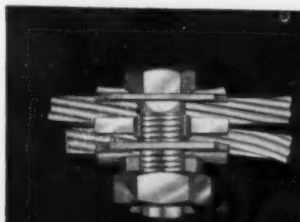
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

QUALITY YOUNGSTOWN SERVICE

Ask your distributor for Youngstown Buckeye Full Weight Rigid Steel Conduit and Youngstown Electrical Metallic Tubing.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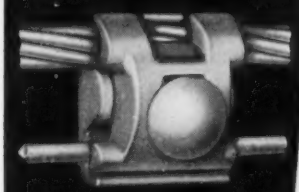
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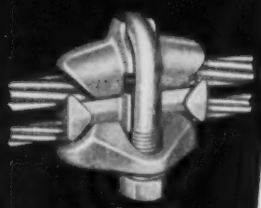
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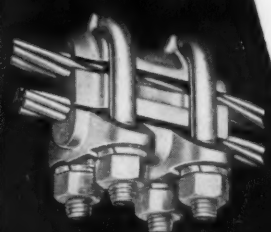
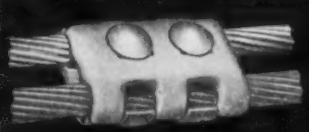

Type 2U AA


Type PAA 400

There's a BLACKBURN clamp for every ALUMINUM CONNECTION

Always Use Blackburn Aluminum Fittings When Terminating or Joining Aluminum Conductors

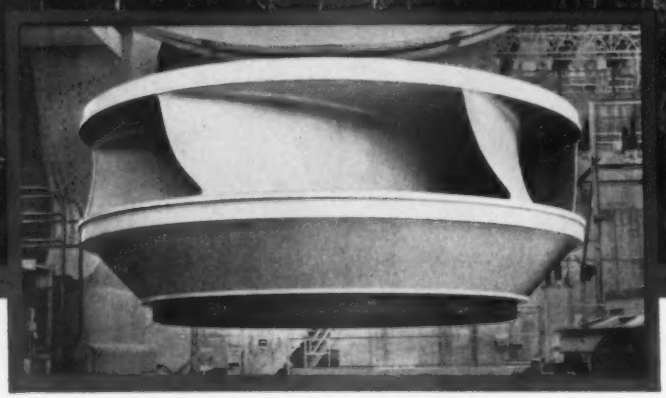
- Each clamp accommodates a wide range of conductors.
- Castings are high-strength, corrosive-resistant, heat treated aluminum alloy.
- Blackburn special surface treatment eliminates production oxides and improves conductivity.
- Bell contoured grooves protect conductors. Clamping forces are distributed over extra-large contact area.
- Available with galvanized steel or aluminum hardware. Aluminum hardware is alumilited to prevent seizing.
- Can be quickly and easily installed with regular linemen's equipment. No special tools required.

IMPORTANT: We recommend the use of CONTAX on all aluminum connections. CONTAX is an oxide inhibiting compound with an ASTM drop point of 549° F.

BLACKBURN *Aluminum* FITTINGS

JASPER BLACKBURN CORPORATION
35 Madison St., St. Louis 6, Mo.
Phone MAin 1-2821

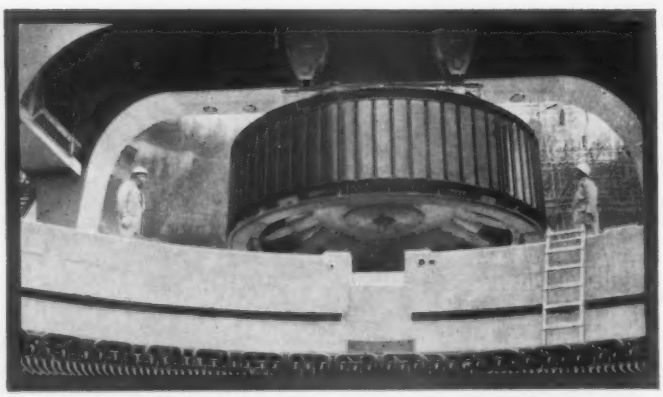
World's Largest Reversible



Shipped in three sections, this world's-largest Francis runner was assembled at the dam site.

At Hiwassee Dam, adding a pump-turbine, rather than a conventional turbine-generator unit, is expected to increase peaking capacity as much as 44,000 kw during extended periods of low water.

NOW Installed and Operating at TVA's Hiwassee Dam



Here, the 310-ton, 329-inch diameter generator-motor rotor is ready to be lowered into stator.

— storing off-peak power as re-usable water

ALLIS-

Pump-Turbine Combination

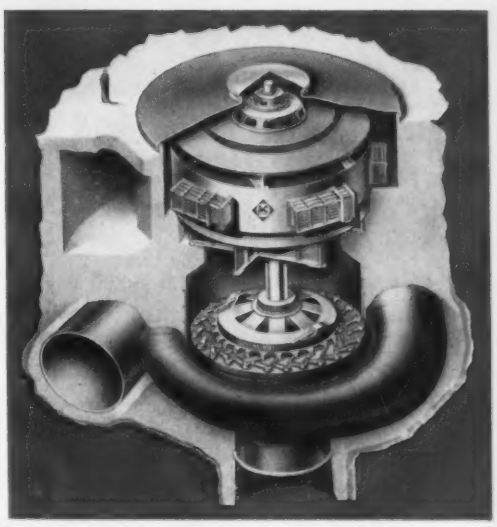
● In a single unit, this pioneering hydroelectric installation operates as a 70,000-kva turbine-driven generator when rotating in one direction, and as a 102,000-hp motor-driven pump when it rotates in the reverse direction.

As a turbine it has a maximum capacity of 112,000 hp to generate valuable peaking power during demand periods.

As a pump it has a rated capacity of 3900 cubic feet per second against 205-ft head — nearly three times the water requirements of New York City. When off-peak power is available from other plants on the TVA system, this unit — with its 102,000-hp motor, the world's largest — pumps water into storage for re-use during peaking periods.

This reversible pump-turbine is further proof that you get *MORE* design advances *first* from Allis-Chalmers — builder of over 15 million installed hydraulic turbine horsepower.

For all or any part of *your* needs, call the Allis-Chalmers representative near you, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, U.S.A. Manufacturing plants in the United States and Canada.



In this cutaway view, size of pump-turbine unit is indicated by man standing on upper level.

CHALMERS

A-C ALLIS-CHALMERS

A-5119

100% VITRIFICATION of porcelain is proved in a dye penetration test. As one of 77 production controls of Locke® suspension insulators, pieces of fired shells are immersed in dye under 10,000 lbs./sq. in. pressure for six hours. Slightest dye penetration causes rejection of entire lot.

BELOW: Re-breaking of immersed porcelain piece confirms non-porosity by absence of dye absorption along broken edge.

How good can an insulator be?

CONSIDER THESE TESTS OF

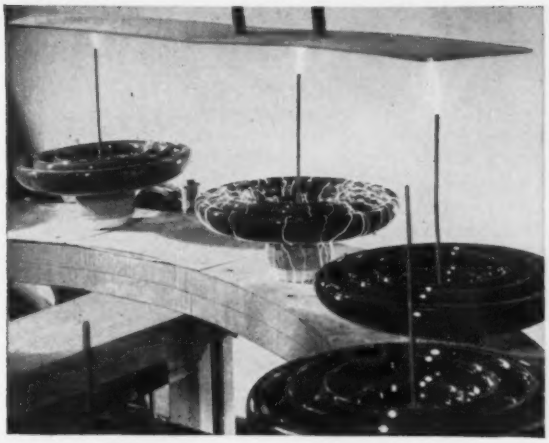
Satisfactory micro-structure of the fired insulator shell, assuring mechanical and electrical soundness, is an absolute *must* before it is allowed to become part of an insulator for your lines.

While the completed porcelain may appear solid, smooth and uniform at an outward glance, only close microscopic examination and other tests can prove it homogeneous, non-porous and properly glazed. Porcelain must be completely vitrified. For satisfactory composition, density must be uniform and within narrow limits.

Glaze must be of prescribed thickness to obtain maximum mechanical strength. The procedures shown above are individually scheduled as dictated by sound engineering judgment. They are your assurance of the dependability of each Locke insulator.

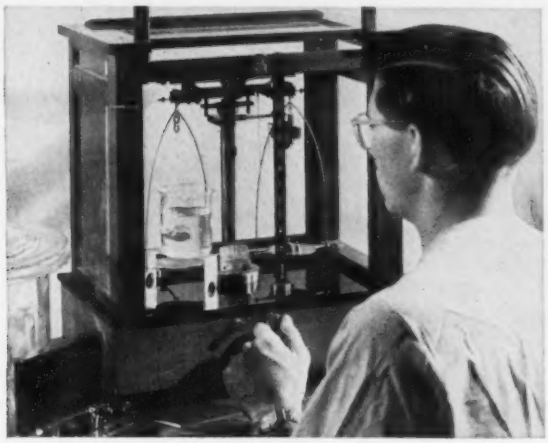
The case of Fired Porcelain "Quality Control" is typical of the extremes to which General Electric goes to assure trouble-free service on your system.

For a brief and complete picture story of insulator quality control, simply ask your General Electric Insulator representative or write to Insulator Department, General Electric Company, P. O. Box 57, Baltimore, Maryland.



FIRST ELECTRICAL TEST of porcelain shells follows firing. Moving on a conveyor, they must withstand a 3- to 5-second flashover test at about 200 kilocycles without puncture.

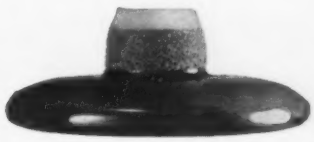
EXACT GLAZE THICKNESS, vital to the mechanical and electrical strength of the finished MICROGLAZE* insulator, is accurately determined by microscopic measurement.



FIRED DENSITY TEST—As the specific gravity of properly vitrified porcelain falls within a very narrow range, it is possible through this test to detect very small deviations from satisfactory composition.

TISSUE THIN PORCELAIN sections, when examined through a petrographic microscope, reveal their crystalline structure and state of maturity.

FIRED PORCELAIN



Progress Is Our Most Important Product

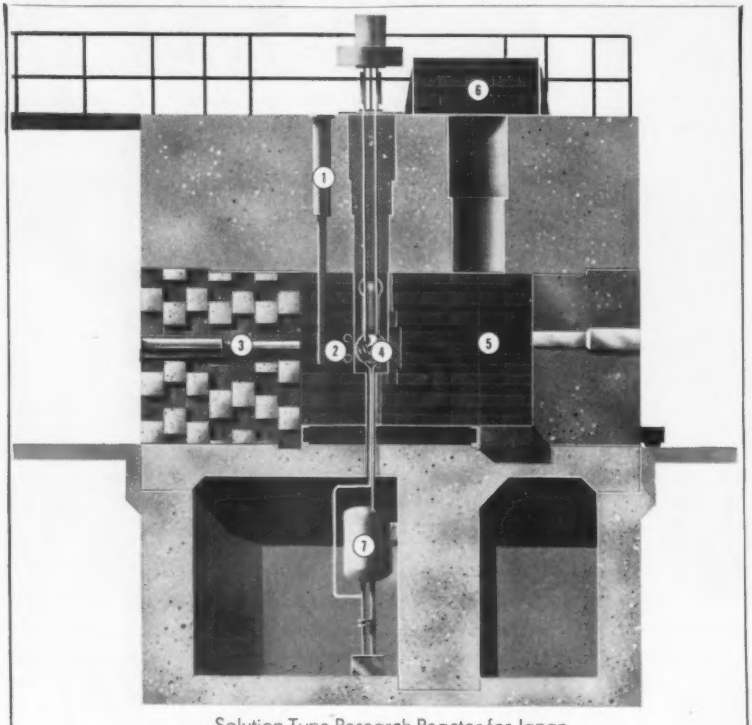
GENERAL ELECTRIC

*Trademark of General Electric Company

NUCLEAR NEWS FROM ATOMICS INTERNATIONAL

Aqueous, homogeneous type nuclear reactor being built for Japan

The first nuclear reactor for the Far East is being built by ATOMICS INTERNATIONAL for the Atomic Energy Research Institute of Japan. The reactor will be located near Tokyo. When the reactor starts operating early in 1957, a full program of research into the peaceful applications of nuclear energy will begin. This program includes the production of radioisotopes, studies in neutron activation, neutron diffraction, radiation effect on materials and training in reactor techniques.



Solution Type Research Reactor for Japan.

1—Vertical thimble
2—Pneumatic tubes
3—Beam Tubes
4—Central exposure facility
5—Horizontal thermal column
6—Vertical thermal column
7—Gamma radiation area

At a rated power of 50 kilowatts, this solution type reactor will produce a peak thermal neutron flux of 1.7 x 10^{12}/cm^2 sec. Equipped with a five foot graphite thermal column, it will provide an extensive source of slow neutrons. Additionally, the room beneath the reactor housing the gas handling system has been designed to provide neutron-free gamma irradiation. This facility, ideally suited for biological and chemical experiments, will provide 50,000 curies of radioactivity in Xenon and Krypton gases circulating in the system.

The core of the reactor is a stainless steel sphere with a diameter of approximately 12 inches, filled with a uranyl sulphate solution. The fuel investment is approximately 1000 grams of Uranium^{235}. The reflector around the core consists of graphite stacked in a rectangular steel tank 5 feet high, 5 feet wide and 8 feet long. Appropriate holes for experimental facilities and instrumentation are located in the graphite. Five feet of dense concrete provides a shield around the reflector tank.

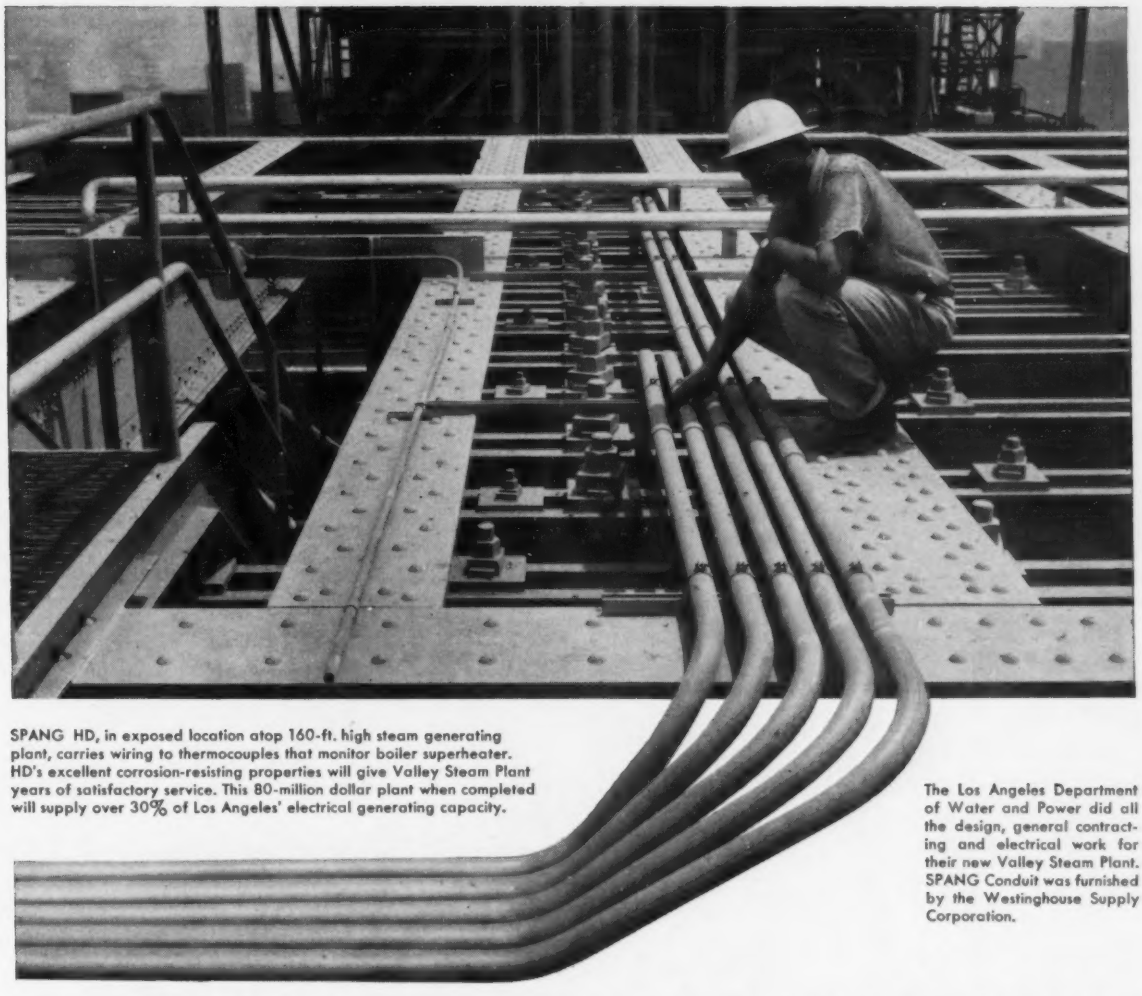
Instrumentation control is provided by two types of sensing elements which give neutron level information. In the power range up to approximately 1 watt, two fission chambers are employed. In the power range of approximately 0.1 to 50,000 watts, two gamma compensated ionization chambers are used. One of these chambers is fed into a shutdown channel and an electrometer which in turn sends a signal to the power level recorder. Power level is automatically maintained by feeding an error signal from the level recorder to a servo-amplifier which drives the regulating rod motor in the proper direction to correct error. The other ionization chamber feeds a logarithmic amplifier, and period shutdown circuit.

The core cooling system consists of a closed, recirculating system using demineralized light water. The core cooling loop includes about 90 feet of stainless steel tubing, the associated pump, valves and piping, and a heat exchanger to transfer the heat to a secondary cooling system.

ATOMICS INTERNATIONAL, a division of North American Aviation, Inc., is a major reactor builder—experienced in the design, construction and operation of nuclear reactors for research and the production of power. A reactor similar to the one scheduled for Japan has been installed for the Armour Research Foundation of the Illinois Institute of Technology in Chicago. It is one of several in-action nuclear reactors designed and built by ATOMICS INTERNATIONAL.

If you are interested in any phase of reactor technology, ATOMICS INTERNATIONAL is staffed and equipped to serve you. Please write: Director of Technical Sales, Department ET-N4, ATOMICS INTERNATIONAL, P.O. Box 309, Canoga Park, California. Cable address: ATOMICS.

ATOMICS INTERNATIONAL
A DIVISION OF NORTH AMERICAN AVIATION, INC.
PIONEERS IN THE CREATIVE USE OF THE ATOM



SPANG HD, in exposed location atop 160-ft. high steam generating plant, carries wiring to thermocouples that monitor boiler superheater. HD's excellent corrosion-resisting properties will give Valley Steam Plant years of satisfactory service. This 80-million dollar plant when completed will supply over 30% of Los Angeles' electrical generating capacity.

The Los Angeles Department of Water and Power did all the design, general contracting and electrical work for their new Valley Steam Plant. SPANG Conduit was furnished by the Westinghouse Supply Corporation.

OVER 600,000 FT. OF SPANG HD PROTECTS WIRING AT VALLEY STEAM PLANT

To keep ahead of the rapidly expanding demands for electricity, the Los Angeles Department of Water and Power is completing its new 512,000-kw. Valley Steam Plant in San Fernando Valley. Protecting the wiring in this mammoth installation are over 600,000 ft. of SPANG HD (hot-dipped, heavy-duty) Galvanized Conduit.

SPANG HD will give Valley Steam Plant *top-quality* wiring protection in both exposed and protected locations, because the SPANG HD galvanized and lacquered finish retards the formation of white rust and provides excellent corrosion resistance.

SPANG HD is easy to work with, too! For instance: the *quality-controlled* manufacturing at SPANG produces a uniform product, easy to bend, easy to thread, easy to cut. The *top-quality* galvanized finish will not chip, crack, peel or blister even under the most severe bending strains.

You'll get top performance from SPANG HD on any conduit installation. Try it and prove to yourself why SPANG HD should be your first choice every time. Your nearby SPANG Distributor carries the complete SPANG Conduit line. Let him serve you!

SPANG Conduit uniformity means easier bending, cutting and threading on the job. The top-quality HD finish will not crack, chip, peel or blister during bending.

SPANG® CONDUIT

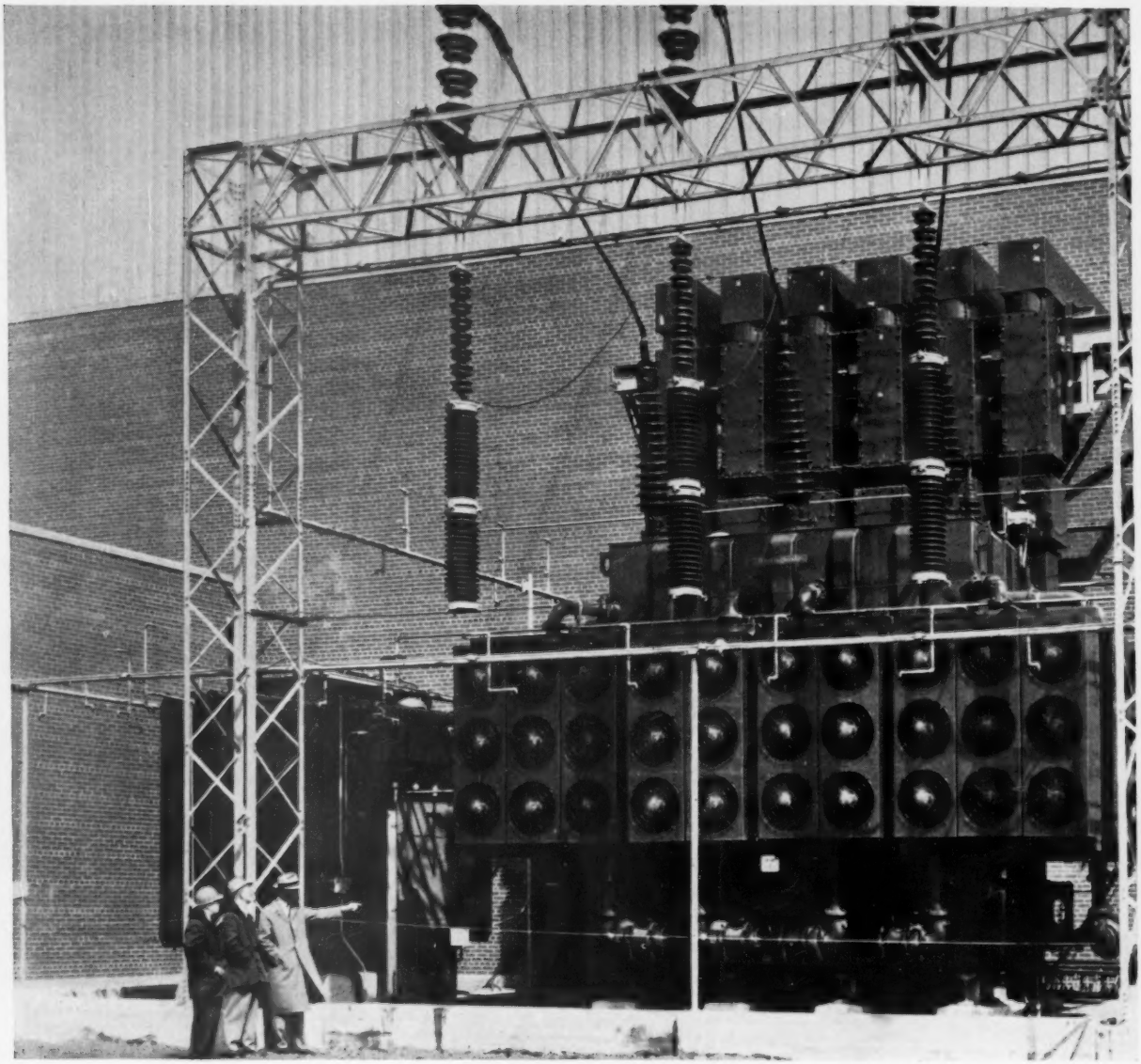
SPANG-CHALFANT

Division of The National Supply Company

GENERAL SALES OFFICE:

TWO GATEWAY CENTER, PITTSBURGH, PA.

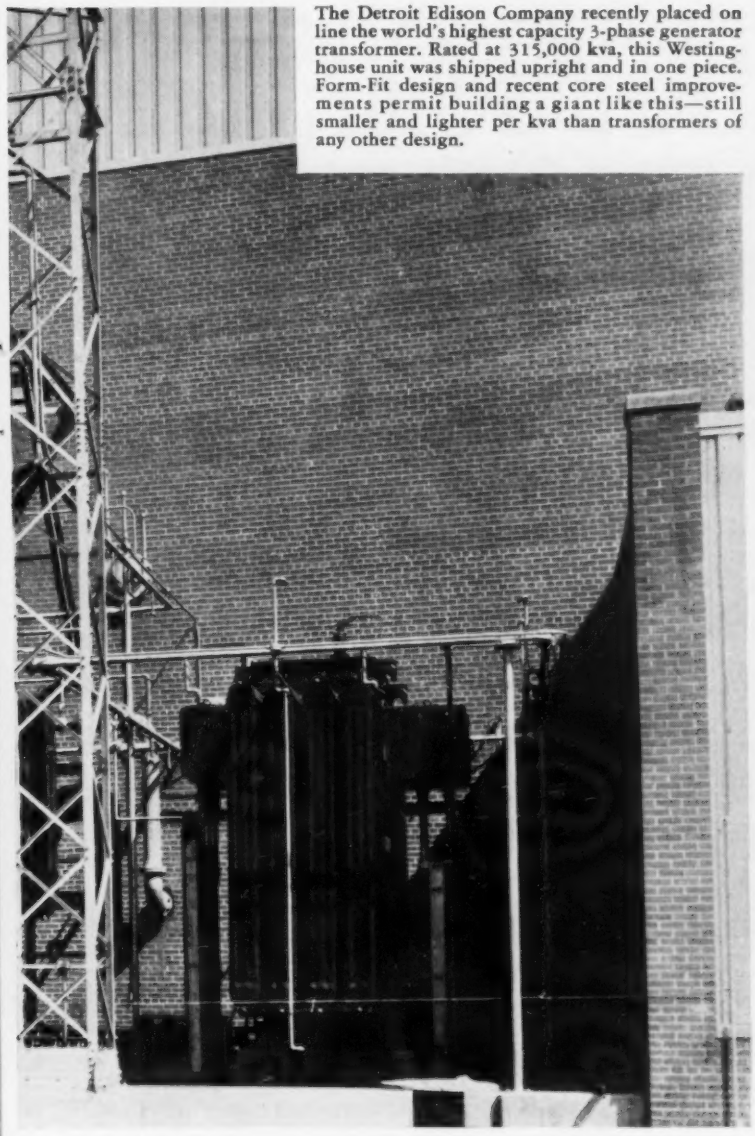
District Offices and Sales Representatives in Principal Cities



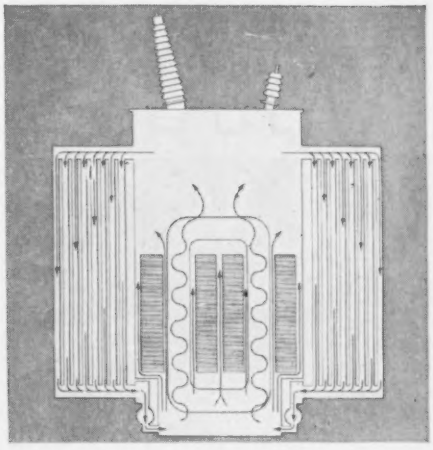
FORM-FIT® TRANSFORMERS

...A basic design with room to grow

World's highest capacity generator transformer again proves economy of exclusive Westinghouse design

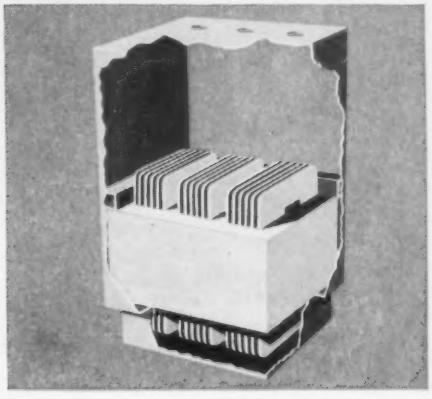


The Detroit Edison Company recently placed on line the world's highest capacity 3-phase generator transformer. Rated at 315,000 kva, this Westinghouse unit was shipped upright and in one piece. Form-Fit design and recent core steel improvements permit building a giant like this—still smaller and lighter per kva than transformers of any other design.



Close-fitting tank and vertical coil construction together form directed paths for coolant. Forced oil cooling eliminates the need for thermal head. Maximum coverage of coil surfaces and efficient use of oil give you a compact, economical unit.

With shell-form construction, the core surrounds, supports and protects a series of upright coils. This arrangement provides excellent mechanical strength . . . capable of withstanding the stresses imposed by shipping, installation and service.



Here is one basic idea in high-voltage transformers that has consistently given you more equipment per dollar invested. It's Form-Fit design. A Westinghouse exclusive, Form-Fit design has proved superlatively efficient, yet practical in both size and weight . . . at any rating.

Here is what Form-Fit construction does, for instance, to improve heat transfer while reducing bulk of the transformer. All coils are vertical, and in pancake-fashion are interleaved with insulation. This structure forms long, straight ducts allowing free flow of oil from bottom to top, and on both sides of each coil. With forced cooling, a high volume of oil circulates over a maximum surface, following these naturally efficient paths without the use of special baffles. Result? More efficient heat transfer and lower temperature differences.

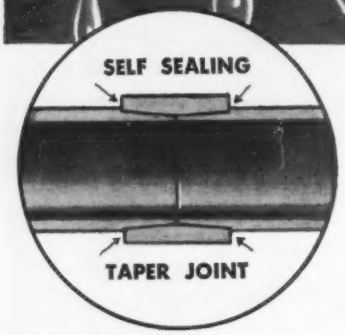
And surge strength? Form-Fit design provides it, with the large-area coil giving high coil-to-coil and low coil-to-ground capacity. Distribution of impulse voltage is excellent. Dielectrically, the Westinghouse Form-Fit principle can be extended to any voltage level.

So here's a design with room to grow . . . for capacity not yet specified, for transformers not yet built. To make absolutely sure you get all the quality and performance you'd expect from Westinghouse, all power transformers rated above 10,000 kva and 69 kv are impulse tested right on the production line.

Get in touch with your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70768

WATCH WESTINGHOUSE *WHERE* ***BIG*** *THINGS ARE HAPPENING FOR* ***YOU!***

WATERTIGHT!



Orangeburg Fibre Conduit Prolongs Cable Life

Keep out corrosive ground waters, and you prolong the life of underground cables, say utility engineers!

Why? Because ground waters containing corrosive elements derived from the soil and concrete encasement attack cable sheath and shorten cable life. Orangeburg's impermeable wall and self-sealing Taper-Sleeve Joint shed them *"like water off a duck's back."* You get maximum protection with Orangeburg.

Orangeburg protects cables in many other ways. Smooth bore, low co-efficient of friction reduce incidence of abrasion. Its material is strong, tough, resilient, durable.

No other conduit is easier to install

Light, 8-foot lengths and a complete line of bends and fittings speed installation. Taper-Sleeve Joints tap water-tight in a jiffy. Orangeburg lays faster and at lower cost than any other type of conduit.

Orangeburg Fibre Conduit has prolonged cable life at minimum expense for utilities, municipalities and industry since 1893.

Distributed by Graybar Electric Company and by General Electric Supply Company. Branches and stocks in principal cities.

WRITE DEPT. WE-86 FOR CAT. 52

ORANGEBURG MANUFACTURING CO., INC., Orangeburg, N. Y. West Coast Plant, Newark, Calif.

ORANGEBURG®
FIBRE CONDUIT

GEDNEY'S RIGHT THERE IN YOUR CORNER

helping save time . . . hold down costs

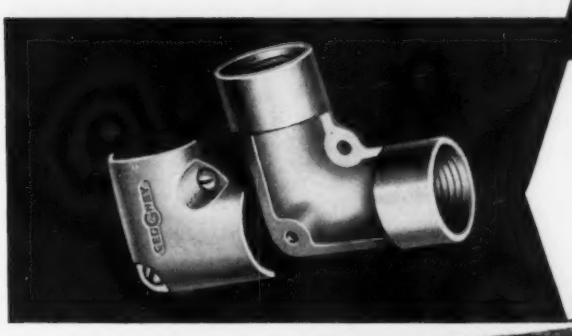
CORNER FITTINGS? Well, here are three that have proved immensely popular for the simple reason they're easiest to install—save time and labor that really counts up. Like the rest of the full Gedney line they're made of unbreakable malleable iron...accurately machined and threaded . . . individually inspected. Order Gedney—always—for lowest installed costs!

90° CORNER ELLS

Fitted with gasketed cover. Both ends female. Made of malleable iron, cadmium plated. Available in a full range of sizes from ½" to 2".

90° CORNER ADAPTERS

Fitted with gasketed cover. One end male, one end female. Made of malleable iron, cadmium plated. Your choice of sizes from ½" to 2".



CORNER PULL-IN CONDUIT ELLS

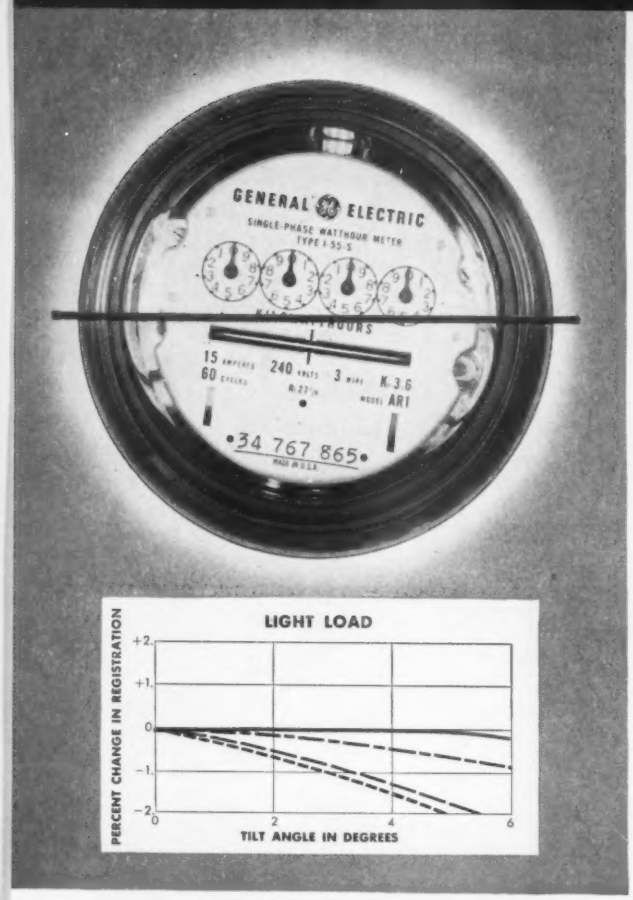
Today's top specification for space-saving, machine wiring, easy wire pulling. Malleable iron, cadmium plated. Sizes run from ½" to 2".

GEDNEY FITTINGS FIT

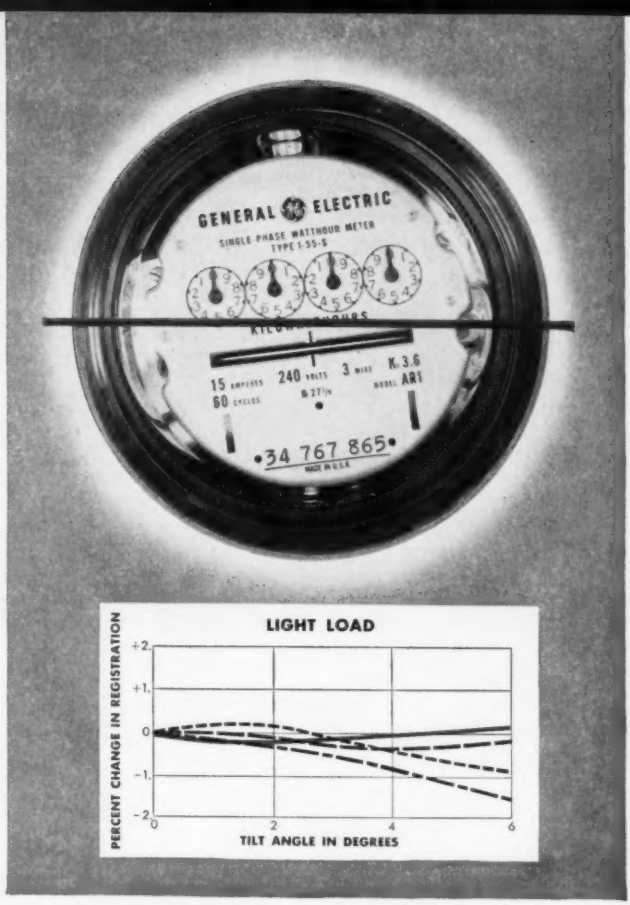
GEDNEY
ELECTRIC COMPANY

RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

CLOCKWISE



COUNTER-CLOCKWISE



LEGEND: G-E I-55 meter ———— Meter "A"— — — — Meter "B"------- Meter "C"—·—·—

Lab tests prove . . .

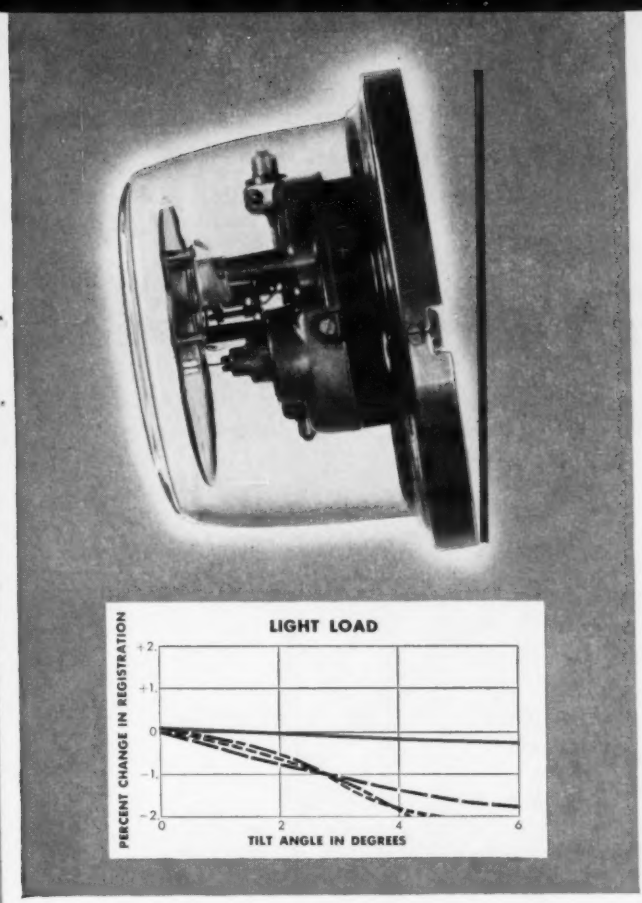
G.E.'s NEW "PERFECT PARTNER" . . .

the S-1 square meter socket, designed for use with extended-range meters such as the G-E I-55 on installations up to 100 amps.

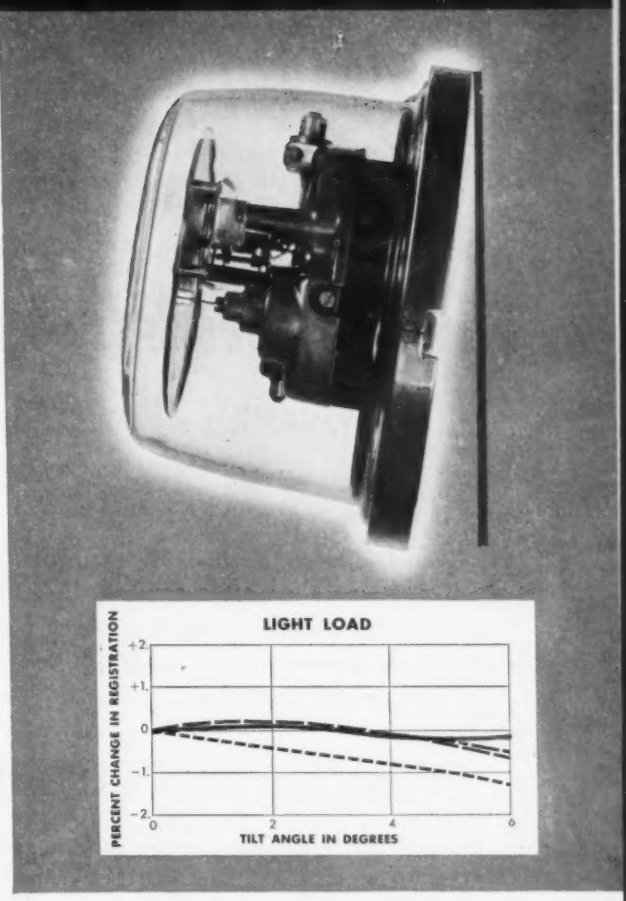
LIVE BETTER ELECTRICALLY

LIVE BETTER...*Electrically*

FORWARD



BACKWARD



LEAST AFFECTED BY TILT

G-E MAGNETIC SUSPENSION SYSTEM SAVES YOU REVENUE NORMALLY LOST THROUGH TILT ERRORS

Any meter installed slightly out of plumb will give inaccurate readings which, in most cases, result in loss of revenue. By using General Electric meters with magnetic suspension the errors from tilt are virtually eliminated and the loss of revenue is negligible.

Recently a series of tilt tests were conducted at G-E laboratories. Both G-E meters with the "floating disk" and ordinary meters using conventional ball bearings to support the moving element were subjected to operation at various degrees of tilt. Here is what the tests revealed:

1. As the angle of tilt was increased on ordinary meters with ball bearings, additional friction resulted. This increased friction could result in substantial losses of revenue.

2. The magnetic suspension system of G-E meters developed no measurable friction when operated out of plumb . . . even as the angle of tilt was increased. Life of the G-E meters was not affected and only negligible tilt errors in registration resulted.

Virtual elimination of tilt errors is only one of many ways that G-E meters help pay for themselves time and again through more accurate measurement of all the energy you supply. For other important money-saving benefits—greater sustained accuracy, longer meter life with less maintenance and testing time, and elimination of bearing replacement—specify G-E meters of the I-50 family. . . . the only meters with the "floating disk."

For more information, contact your nearby G-E Apparatus Sales Office, or write General Electric Company, Section 621-7, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

25TH ANNIVERSARY of MICROWAVE COMMUNICATIONS

...PIONEERED in 1931 by IT&T

Today, all the world-wide technical, manufacturing, installation and operating experience gained by IT&T engineers since the birth of microwave is now available in one great system—

Federal MICROWAVE

A new age of communications was born 25 years ago when IT&T engineers conducted the world's first successful demonstration of microwave . . . across the English Channel.

In the brief span of one generation microwave has spread all over the globe. In North America, the trail was blazed by *Federal* Microwave . . . supplying tens of thousands of channel miles . . . operated by pipelines, power utilities, telephone companies, municipalities, administrations, TV stations and others . . . bringing new speed and dependability to their communications, supervisory and control operations.

Whatever its needs . . . for today or tomorrow . . . industry can look to *Federal* Microwave with confidence, for no other system possesses such a long background of quality and performance ..."*Certified by a World of Research.*"

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ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Unsettled prices

Prices of electrical materials have been fluttering between the lowering costs of copper and the increasing costs of steel. With the copper market down, wire prices reflected it and some electrical materials also. However, most of them contain steel. That took a rise even before the strike began and after it is over may take another.

Summer slowdown

Strikes have slowed down construction. Although the electrical workers got what they wanted in wage increases, it was other strikes that were holding up construction and may hurt them too. The nation-wide steel strike was beginning to hold up major construction projects needing structural and reinforcing steel. Conduit had not yet become scarce, although some stocks may be declining. The San Francisco Bay area has been plagued by plumbers, carpenters, painters (and graveyard) strikes.

GOP power

Power for the Republican national convention in the Cow Palace in San Francisco provided one of the most intricate and extraordinary wiring jobs in the West for George Brayer, electrical contractor, as well as General Electric for transformers, PG and E for power, Pacific Telephone & Telegraph for radio, telephone and TV circuits. Interior lighting was increased eight times in order that TV cameras could pick up action on the floor at any point. Power was increased from 750 to 3,000 kw, with an additional feeder line and throwover equipment to reduce any possibility of power failure.

Shows 'em

Selectric Home, erected by the Inland Empire Chapter of National Electrical Contractors Assn. in Spokane, was due to open Aug. 1 for a two-month demonstration period. The chapter financed and built the home in order to prove that a full-scale electric job need not run the total cost of a home out of line for the pocketbook. See story on p 100.

Almost

S-1644 missed being called to the floor of Congress for action by only a few votes, July 24. This will table the bill for this session of Congress. Some comfort is being taken by the sponsors, National Electrical Contractors Assn. and other associations of mechanical specialty contractors, that the motion to bring it on the floor for action out of the rules committee received a 245 to 145 vote, almost enough for the two-thirds majority necessary. It will have to be reintroduced as a new bill at the next session of Congress. The bill, called Federal Contract Construction Act, would require general contractors to list subbidders on government contracts and likewise would stop bid peddling and shopping. Any lowering of cost by such methods would have to revert to the government.

Bigger list

Total licensed contractors of all types in California number 76,870 as the renewals of state licenses have been counted. Of these, 4,964 are electrical or C-10. The State Contractors License Board elected S. Glen Haightman, Los Angeles plumber, as its chairman. Edgar Buttner, Oakland electrical contractor, is on the legislative, finance and budget, and is chairman of the rules and regulations committee.

Street lighters

International Municipal Signal Assn. holds its big annual convention at Denver Sept. 17-20. At this meeting, Larry Soares, Oakland superintendent of the Electrical Department, is slated to be the new president. The Western Section meeting will be held Aug. 24-25 at the Santa Rosa Hotel, Santa Rosa.

Give cause

Grounding of service to water piping systems, brought before the Public Utilities Commission of California by water utilities, was finally settled by changing the offending paragraph that permits the utility to shut off the water service without notice if an unsafe or hazardous condition is found to exist. The added provision was made: "provided the utility shall notify the customer immediately of the reason for the discontinuance and the corrective action to be taken by the customer before the service can be restored."

Its work is done

Valley Electrical Supply Co., known in the San Joaquin Valley since 1911, first as an electrical contracting and in later years an appliance distributing organization, will step out of the business Aug. 31, it was announced by Kenneth L. Hampton, vice-president and manager. Originally organized by H. H. "Kelly" Courtright, he was its president for many years before his death last December. In the early days of the valley, the firm did electrical contracting business on a highly ethical scale to set a pattern for the industry. It was always active in contractor association activities. It retired from the contracting business some 15 years or so ago.

New veeps

Two new regional vice-presidents of the Illuminating Engineering Society were announced following the annual election. Kenneth Reid, chief electrical engineer and superintendent of street lighting for the city of Victoria, B. C., is the new Pacific Northwest regional vice-president. He is a graduate of McGill University, Montreal. Carlton M. Thompson, commercial lighting sales engineer, San Diego Gas & Electric Co., is the new South Pacific regional vice-president. The new president is Marshall N. Waterman, Westinghouse Lamp Division, Bloomfield, who attended the regional conferences in the West in 1955 . . . Next regional conference for the Pacific Northwest will be held in Victoria, B. C. The Southwest regional conference may be held in San Diego or at least somewhere in southern California. The 1959 national convention is scheduled to come to San Francisco.

NAED plans

Exceptional interest already has been aroused over the annual convention of the Pacific Division, National Electrical Distributors Assn., at the Hotel Westward Ho, Phoenix, Sept. 30 to Oct. 3, according to Bill Jewell, managing director. Already reservations in the Westward Ho are all gone and future reservations will be made at the Sahara. While speakers programmed have not yet been announced, a change in the arrangement of meetings is significant. Instead of the first meeting being devoted to an executive session for members only, Oct. 1, a general session for members and their guests will be opened by a welcome by the governor of Arizona. He will be followed by two important speakers. The members' meeting will be that afternoon. Two more general meetings are scheduled for Tuesday morning and Wednesday morning, with a final luncheon open to members, guests and their ladies at noon, Wednesday, addressed by J. T. Kimball, former vice-president of Arizona Public Service, and now vice-president and general manager of Idaho Power Co. Golf prizes will be awarded from 5 to 6 on Wednesday afternoon and the banquet that night only has the copper cup presentation.

We've heard

Among people, this news. Joe E. Pearce, former manufacturer's representative, became Day-Brite representative in the area of Albuquerque and El Paso, Tex., May 1. He headquarters in Albuquerque . . . Herman Milbrath, for more than 30 years an electrical contractor in Berkeley, has been made temporary electrical inspector for the city of Berkeley as John Thompson was moved up to chief electrical inspector . . . Charles Alden, recently representing Luminous Ceilings Inc. in northern California, has joined the lighting division of Sylvania Electric Products . . . Eugene V. Nelson was elected business manager and financial secretary of IBEW local 46, Seattle, succeeding L. E. Thomas, whom he defeated in an election. He had served under Thomas as business agent for five years . . . John McDonald is the new lighting specialist for North State Electric Co., San Francisco . . . Seems we erred in reporting that Cy Hughes, now with Smoot-Holman Co., had previously been wtih Sunbeam Lighting Co., Los Angeles. Daniel Rashall tells us it isn't so.

Some more changes

Some contractor notes—Dahl-Beck Electric Co. opened a new branch in Sunnyvale on Kifer Road. The San Francisco firm already had a Redwood City branch under Grant Whittaker . . . Del Monte Electric, originally from the Monterey Bay area, started by B. A. Solomon, is no longer affiliated in any way with the Stolte Co., general construction firm. It is now a wholly owned corporation with Foster E. Daoust as president, Robert L. Munk vice-president. Offices remain at 8275 San Leandro St., Oakland . . . For the first time in San Francisco's history, an electrical contractor has been given a city contract for maintaining street lighting equipment. The Electrical Maintenance & Service Co. of 55 McAlister St., Fred Wieder proprietor, has such a contract. Previously Pacific Gas and Electric Co. maintained the city's street lighting.

Financing of wiring seems to be taking hold in the Pacific Power & Light Co. territories, according to the company's "Current Plugs" for June. By that time 150 wiring contracts had been financed, mostly for electric water heater installation. **Picking up**

Arrow-Hart & Hegeman Electric Co. recently held open house for its new district office for northern California at 277 Pennsylvania Ave., San Francisco. Jack Gregory is manager for the district. **Expands**

The Miller line of lighting fixtures has again changed hands in the San Francisco area as a result of a "musical chairs" situation. Formerly handled by Steve Babcock, the line will now be represented by John Epperson and Ray Cooke. Epperson formerly handled the Marco line, which was bought out by Progress. The Marco line is now represented by Al Ellison and Russ Smith. **New lineup**

Plastic pipe may not be good for grounding but Amco plastic pipe, made in San Francisco from a synthetic rubber compound, is finding favor for underground raceway systems for telephones, street lighting, intercommunication, or buried electric lines of any type. The pipe is semiflexible and will make wide bends, but has 90° elbows available. All fittings are bonded on with a solvent which welds the plastic together in an air- and water-tight seal that cannot be broken. Cost is somewhat less than conduit. **Where it does fine**

An auto trailer park electrical distribution cabinet, combining circuit breaker, meter, telephone and television facilities in separate barriered sectons, is being produced by Myers Electric Products Inc. of Montebello, Calif. It is designed for mounting on a steel beam post. **All in one box**

Packaged to contain all the low-voltage equipment for a home modernization of doorbells and chimes is a new kit put out by Edwards Co. It includes a three-way chime that may be finished to suit individual decor, a transformer, two push buttons, automatic fire detectors for a home fire alarm system. **All parts**

A quick guide to electrical service entrance equipment is provided in a new 36-page catalog by General Electric's Trumbull Components Department. It is known as the 1956 Quick Guide and includes circuit breaker load centers, all-in-one meter socket—load center combinations, fuse puller switches, residence fuse panels, meter service entrance switches, and general use safety switches. **Aids in specifying**

A new heat pump is announced by Perfection Industries, a division of Hupp Corp., Cleveland. It comes in 2½ and 7½ ton capacities as a packaged unit with automatic thermostat control. **New one**

How to rate a home's Housepower will be announced to the electrical industry and described at a special meeting of the National Adequate Wiring Bureau in New York City Aug. 8. A new nontechnical approach to the home wiring problem has been developed by the bureau and the Edison Electric Institute's Housepower committee. Representatives of all the sponsor associations in the industry will be present. **Popular approach**

A fog control apparatus using the same idea as that of frost control in orchards has been announced by Diesel Power Inc. of Greenville, Pa. It is a vertically mounted, 28-hp electric motor equipped with a propeller operated at 1,200 rpm to draw down from upper atmosphere warmer air for the dispersal of fog along highways. Accompanying automatic electronic controls can also be incorporated in the system. **Blow it away**

An adequate wiring analyzer has been designed by the Anoka Electric Cooperative. It contains switches for 67 specific types of appliances and farm equipment with space for 50 more if needed. A flip of a switch gives the voltage drop reading at either 120 or 240 v for any given load. Any load from 150 w to 11 kw can be set up on it to give readings as to the wire size and service requirements. **Clever gadget**

To make sure that its special rate for electric water heating does not go astray, Washington Water Power Co. has revised its service rates where the premises are supplied through a single meter. Th 500-kwh block at 7/10c per kwh is assigned only to customers who use electric water heaters but gives them some 200 kwh at that rate over the average 300 kwh per month for water heating for other uses. It is a sales advantage for complete electric usage. **Makes a difference**

Learn the facts

Real action to inform its members can be credited to the Northern California Chapter, NECA, under the thorough planning of Chapter Manager Ernest Kramm and his assistant, Joe Krivanek. To acquaint residential contractors with the entire Housepower and Live Better . . . Electrically program on a local follow-up basis, a special residential modernization meeting was held July 16 in Oakland. Attendance was 40 from three branches of the chapter. Discussion of methods to take care of leads developed from the Housepower contest, ways to develop business from Operation Home Improvement, and even the possibility of setting up a new company to specialize in modernization and rewiring were discussed.

Future analyzed

The industrial potential of Solano and Napa Counties was unfolded at another meeting of this chapter in Fairfield, July 25. It was a joint meeting with PG and E division and commercial managers and was addressed by Donald Daub, industrial development coordinator for the head office, San Francisco. Mutuality of interest in bringing industry into the region was thoroughly discussed at a question-and-answer session, following the speech.

NECA convention

First details about the 1956 annual convention in San Francisco's Civic Auditorium of the National Electrical Contractors Assn. are beginning to trickle West. The convention starts Sept. 24 with meetings of the board of governors. Tuesday night will be the official opening of the convention with the second national electrical exposition in the Civic Auditorium. On Wednesday through Saturday, convention sessions will be held during the morning only, leaving the afternoons and evenings for tours and entertainment. The annual banquet will be Saturday night, Sept. 29.

. . . and election

Two district vice-presidents are to be elected from the West at the San Francisco NECA convention. According to new constitutional changes, this is done by the governors. The vice-presidents for District 6, now Wes Grasle of Portland, and for District 8 Phil Robbins of Salt Lake City, are either to be reelected or succeeded. Another item of business will be a vote on the formation of the new District 9 to embrace California and Nevada.

Construction home

A construction industry center is being planned for Los Angeles and ground will be broken on a $5,000,000 height-limit structure in September. It is sponsored by the Building Contractors Assn. of California to provide headquarters for the building industry. A tower of exhibits, a graphic arts center and trilevel parking area will be parts of the center.

Threat

In Napa, Calif., a municipal judge rendered a decision in respect to requiring of Underwriters' Laboratories listing of electrical materials that may threaten many ordinances if allowed to stand. The Napa electrical inspector, however, intends to take it to higher courts.

Plenty promised

More stable and greater supply of copper is the long-range outlook given by the Copper & Brass Research Assn. after a survey of world markets and production facilities. Heavy investments in facilities to mine and refine copper by the major producers is cited as one of the most favorable conditions.

Help codes

A code advisory committee has been set up by the Arizona Chapter of the inspectors to assist cities in the adoption of new codes or revision of old ones. It will also serve as consultant on code questions that might arise in the Arizona Chapter area.

Aids to selling

Promotion of business can be helped often by sales aids. Among some recent ones contractors can use are these: Sylvania Electric Products has a filmstrip on modern techniques of farm lighting. It is available for showing to agricultural meetings . . . "Full Housepower at Your Fingertips" is the title of a copyrighted Dial-a-Gram useful in permitting the homeowner to make a detailed inventory of both present and desired housepower for a home. Working like a slide rule, the total load is computed quickly with a monthly payment calculator on the back . . . "Loaded Wires" is a fine sound film, running about 10 minutes, available from Federal Pacific Electric Co. offices in the West. It is ideal for showing to service clubs, PTAs and other groups. The adequate wiring story is told with good humor . . . A cable spacing guide is offered by Sunwarm Inc. of Kingsport, Tenn., to aid in designing ceiling heating cable installations by electrical contractors . . . Cords Ltd., division of Essex Wire, has an ingenious folder it calls "Cordinator" for selecting of cords, terminals and plugs . . . "For Safety—Important Facts You Should Know About Grounding Electricity" is a new booklet which interprets and clarifies the 1953 code requirements relative to portable tools and appliances, put out by Arrow-Hart & Hegeman.

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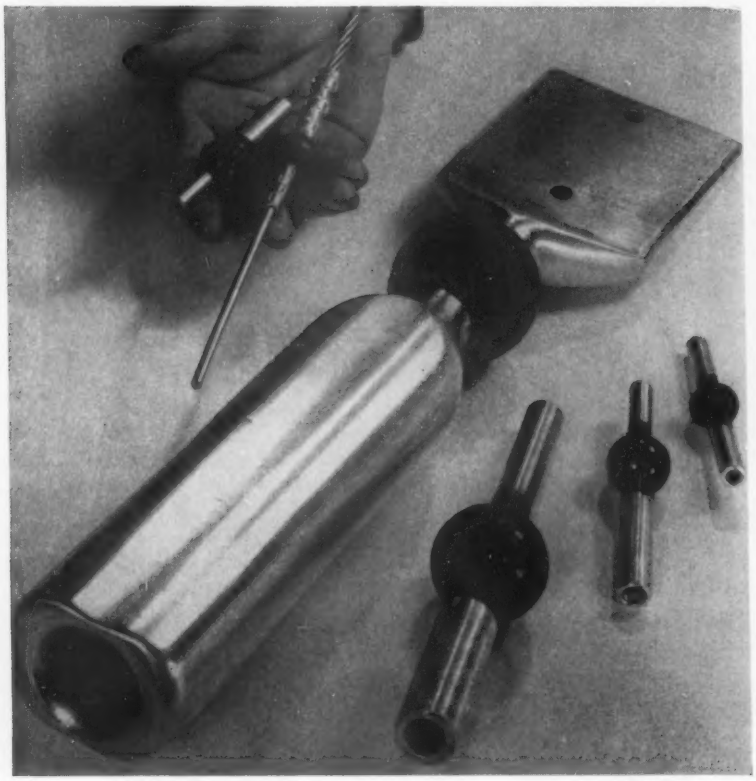
PRODUCT NEWS

New Designs and Applications



Copper-Aluminum Connector

(1) Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif.

Galvanic corrosion and thermo-elastic ratcheting, the two principal problems found in joining aluminum conductor to copper, are eliminated with a new connector developed by this company.

Called Alcunector (a registered trademark), the connector consists of a deep aluminum cup and a deep copper cup butt-welded together at the closed ends and hermetically sealed in a rubber ball and cement.

Announcement of the new connector was made at the summer Pacific meeting of AIEE after it had undergone tests in highly corrosive areas for a period of three years. More than a thousand Alcunectors have been placed in outdoor testing stations and in distribution systems of some 40 utilities. No mechanical failures have occurred, and no significant changes in electrical resistance have been observed.

Portable Interrupter

(2) S&C Electric Co., 4425 N. Ravenswood Ave., Chicago 40, Ill.

Production starts soon on this new portable load interrupting device, which is designed for quick attachment to an open-type distribution cutout or disconnect to convert it temporarily to a load interrupter. Has a nominal voltage rating of 15 kv, the manufacturer reports. Is said to safely interrupt any load current of 400 amp or less at any system voltage from 2,300 through 14,000 v.

Plastic Outlet Box

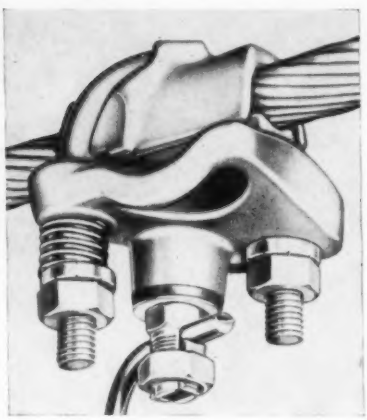
(3) Porcelain Products Inc., 422 W. Sandusky St., Findlay, Ohio

Molded fiber glass is used for this new outlet box, providing an insulated device that will not corrode or attract condensation. Has standard round knockouts; is furnished with or without internal clamps. It is octagonal.

Service Entrance Caps

(4) Electric Fittings Corp., 37-50 57th St., Woodside 77, N. Y.

A hinged hood on this new service entrance cap swings aside for more convenient pull-through of cables. Two sizes of caps accommodate the full range of adequate wiring service entrance cables and other cable sizes.



Hot-Line Clamp

(5) Jasper Blackburn Corp., 36 Madison St., St. Louis 6, Mo.

Swivelok is the name of a new hot-line clamp for large aluminum conductors that has a spring action to aid with installation. Installation procedure is to hang the clamp over the conductor with a shotgun stick and twist. The lower casting pops up to make instant contact. Nuts are then tightened with a socket wrench in the shotgun stick.

Dead-Ending Clamp

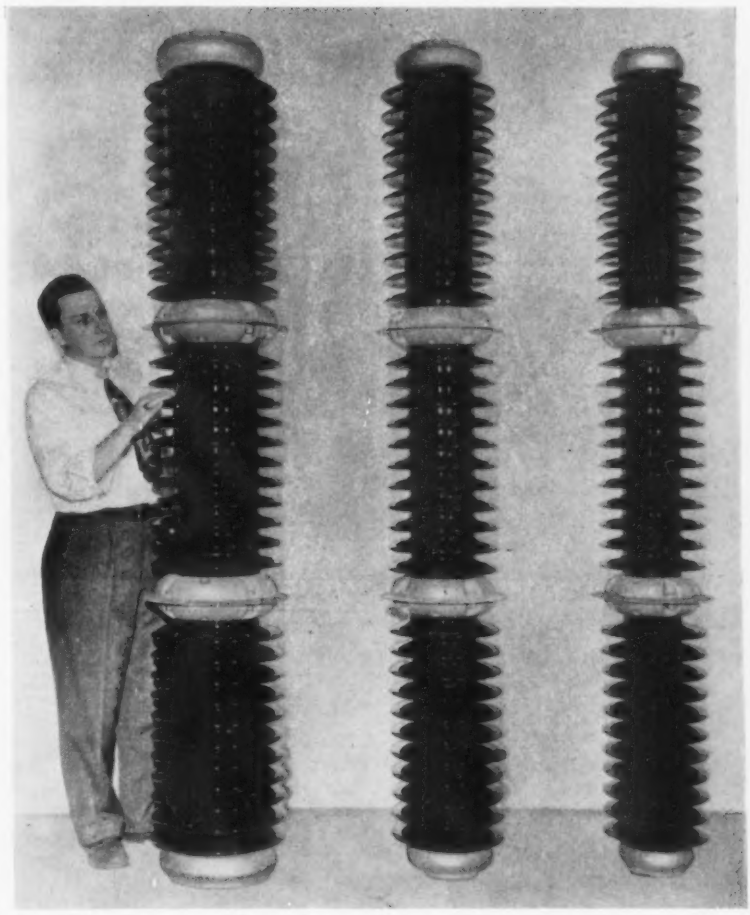
(6) Ohio Brass Co., Mansfield, Ohio

A permanently attached keeper piece has been added to these dead-ending clamps to give easier installation. Hot-line installation is aided by the keepers attached to U-bolts and by special design that holds the keeper in alignment while being tightened.

Distribution Transformers

(7) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

An overload protector that keeps a permanent record of total overload hours is a new feature of an improved line of distribution transformers offered by this company. It is a feature of the conventional line. In the CSP line, the main feature is higher breaker trip settings that boost normal operating range by about 20%. Also, a new method of mounting the protective link in CSP transformers (five kv and below) is used to permit replacing the link in the field. The transformers are built in single-phase ratings from three to 167 kva, 15 kv and below. Three-phase ratings will range from nine to 150 kva, 5 kva and below.



(8) FEWER joints to stack these new high-voltage station post insulators is reported to stiffen the assembly and improve both electrical and mechanical safety margins. The series includes six insulators with a nominal rating of 230 kv. Three of the six have a BIL withstand rating of 900 kv, are 80 in. high and are available with cantilever strengths of 910, 1,450 and 2,750 lb. Three others have a BIL level of 1,050 kv. More information is available on request from Lapp Insulator Co. Inc., LeRoy, N. Y.

Insulation Tester

(9) Hill Research Co., 49 Buckeye Ave., Oakland 18, Calif.

Testing of insulation in large electrical rotating machinery, such as generators, synchronous condensers, motors, etc., is now possible without damage to the insulation material, according to this manufacturer. The method of testing is to rectify increasing increments of alternating current to high-voltage direct current. The direct current is impressed on the insulation under test and then a series of calculations are made with the use of a high-voltage voltmeter and a microammeter to determine strength of insulation before puncture of the insulation. The voltmeter and microammeter are components of the tester. The tester can also be used for breakdown puncture tests.

For Coupon and Bulletins, See Page 69

Air Circuit Breaker

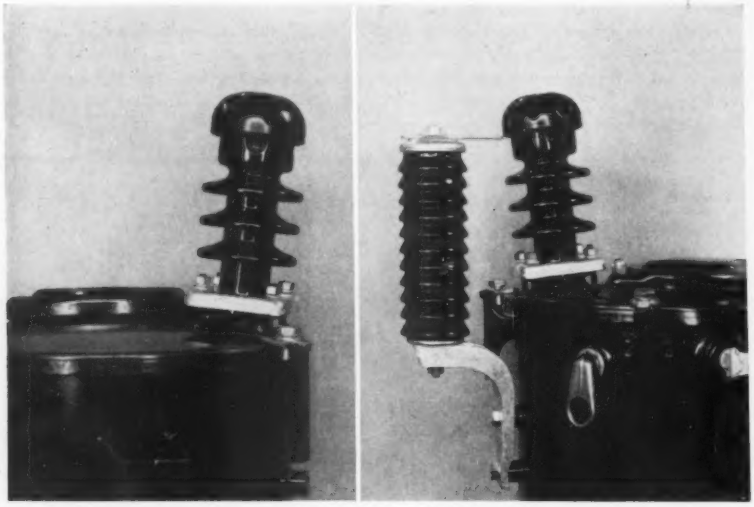
(10) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Lighter weight and smaller size are notable changes in an air circuit breaker announced by this manufacturer. It is rated at 4.16 kv, 50,000 kva, for use in indoor and outdoor metal-clad switchgear. The arc chute tilts back for easy inspection and maintenance of contacts.

Plastic Bushing Cap

(12) Thomas & Betts Co., Elizabeth, N. J.

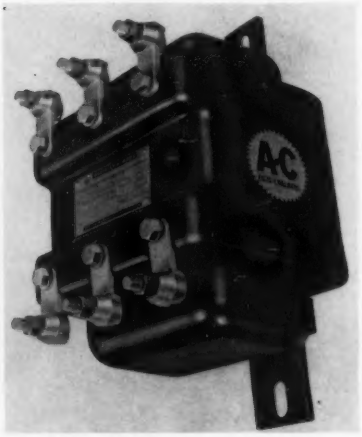
This versatile new bushing cap can be snapped into conduit bushings, insulated bushings, connector hubs and conduit ends with only finger pressure. Can be used on metal or plastic conduit, rigid or EMT. Available in conduit sizes from ½ to 2 in.



Transformer Bushing

(11) Kuhlman Electric Co., 1000 26th St., Bay City, Mich.

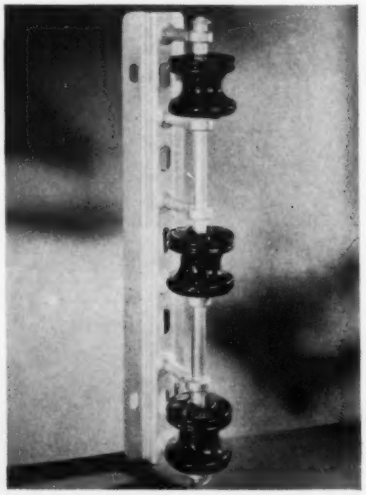
A new high-voltage bushing for distribution transformers rated above five kv offered by this company features a hard rubber hand grip insulated connector. The hand grip also permits installation without tools, according to the manufacturer. In photo the bushing is shown in use with a conventional transformer at left; for CSP application at right.



Autotransformer

(13) Allis-Chalmers Mfg. Corp., 1126 S. 70th St., Milwaukee 1, Wis.

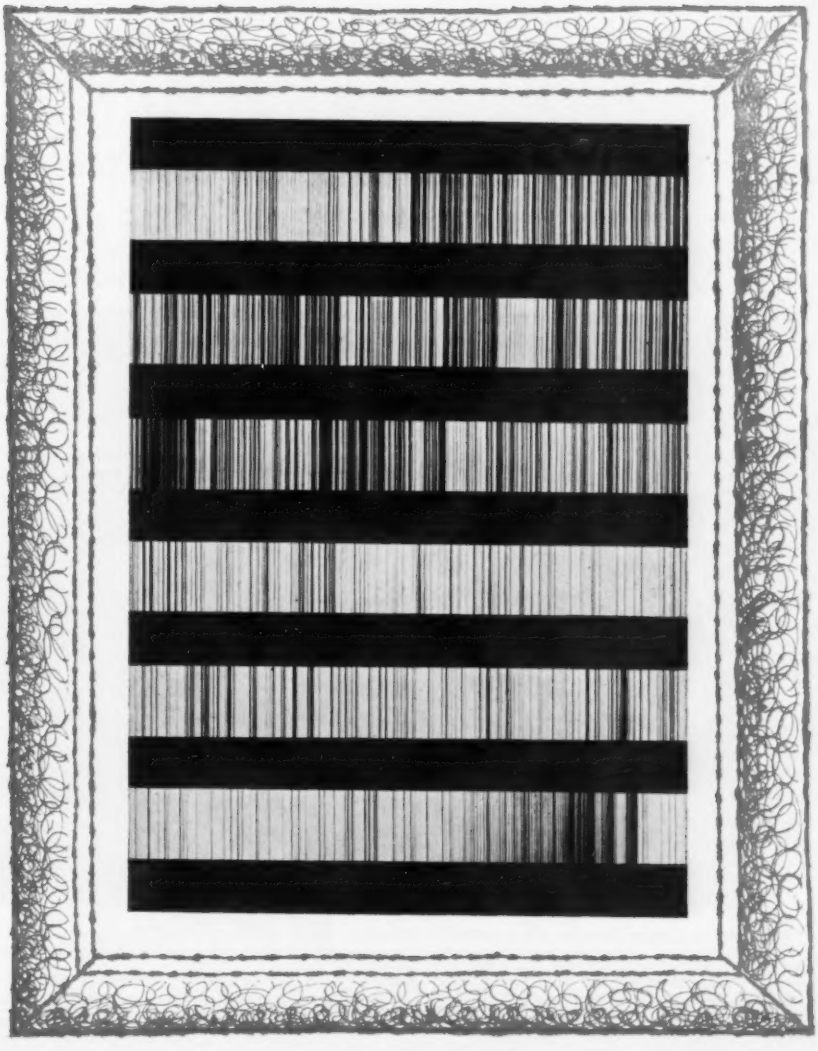
Convenient voltage control where no-tap transformers are used is said to be provided by a light-weight autotransformer announced by this company. It is reported to be suitable for adjusting the voltage ratio of distribution transformers from one voltage to another. Can be mounted in several positions on poles, crossarms or buildings.



Answer to severe corrosion problem in the Indiana Harbor area served by Northern Indiana Public Service Co. was found in this aluminum-alloy secondary rack. Big corrosion factor to be considered by the company's engineers comes from sulphuric gases. The rack shown is made by Hubbard & Co., Pittsburgh, Pa.

For more data fill in coupon on page 69

PORTRAIT OF A CHAMPION



Nichrome*, the famous alloy whose spectrogram you see here, is as truly a masterpiece as any Rembrandt or DaVinci hanging in the galleries—and for largely the same reason.

For the principal elements in Nichrome, *anyone* can combine. What gives Nichrome its unapproachable superiority over all other heat-resistance alloys, is the truly personal elements that go into its making—the all-important, highly specialized skills of the Driver-Harris technicians.

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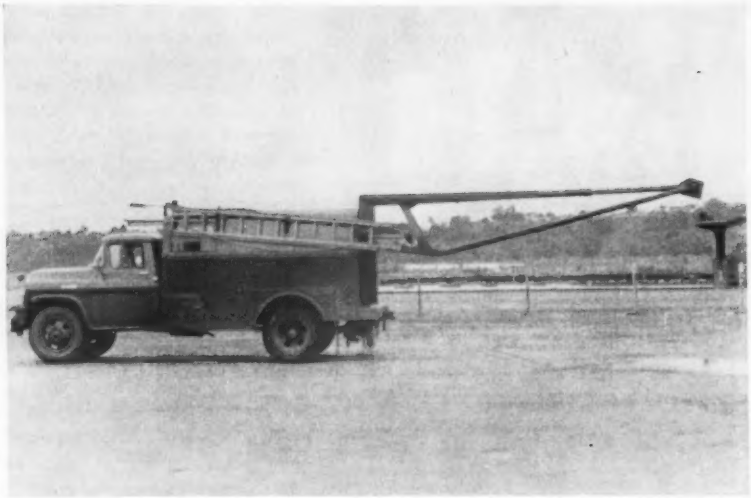


Hydraulic Derricks

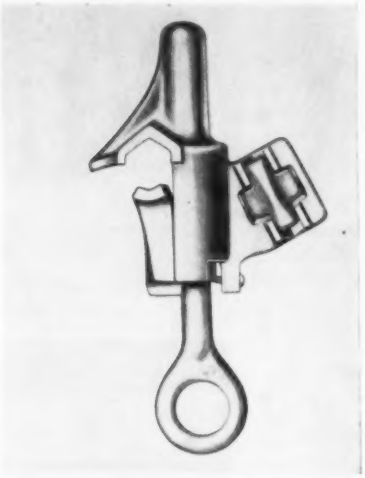
(14) American Truck Equipment Co., Swan Island, Portland, Ore.

This new series of hydraulic derricks has three models with working heights of 18, 23 and 28 ft and respective capacities of 5,000, 8,000 and 12,000 lb. Operation is without pins or sleeves and arc from folded carrying position to ground is more than 180°. Said to be easily mounted on any line construction body with no alterations to body compartment.

Hot-Line Clamp

(17) J. A. Weaver Co., 2110 Howard St., St. Louis, Mo.

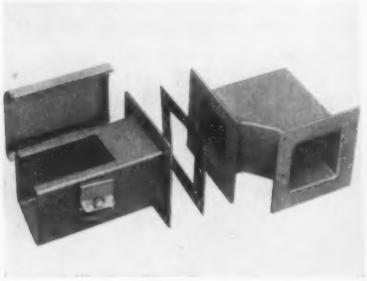
A heavy coat of cadmium and other corrosion-resisting elements is used on this new hot-line clamp to prevent oxidation troubles on bimetal connections. Design of the clamp is said to prevent loose connections and to keep the clamp permanently tight without the use of springs and lock washers. Only one type of clamp in two sizes covers all requirements.



Subway-Style Switch

(16) G&W Electric Specialty Co., 7780 Dante Ave., Chicago 19, Ill.

This new equipment is a 15-kv, 400-amp, subway-style switch for bolting or welding to any make of network transformer for connecting or disconnecting or grounding the feed cables. With different lengths of contacts, the three phases can be grounded separately in sequence.



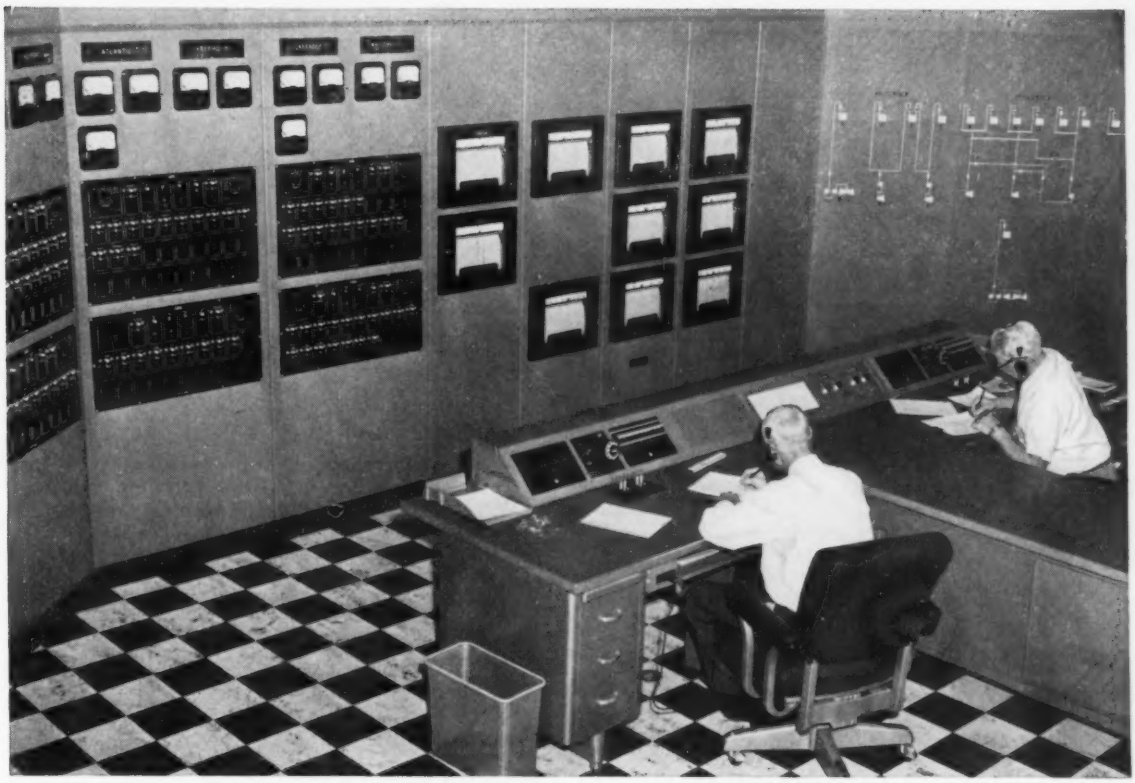
Oil-Tight Raceway

(15) Hoffman Engineering Corp., Anoka, Minn.

This company is introducing a line of oil-tight raceway and fittings that has hinged covers with neoprene sponge rubber gaskets. The raceway is available in two sizes, 2½ in. square or 4 in. square, in lengths up to 10 ft. Fittings include elbows, tees, crosses and closure plates.

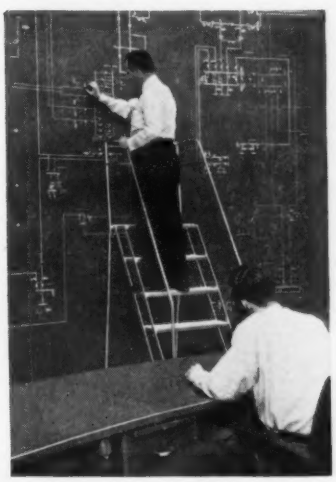
Use coupon, page 69, to secure manufacturer's literature on these products

Westinghouse Electric Co.'s supervisory control equipment was found to be the answer for remote controlling of airport lights at Chicago's new commercial airport, O'Hare Field. Problem was to relocate the control tower 6,000 ft without tearing up runways and ramps for cable installation. Contact is maintained between the new control tower and the old vault with a single telephone circuit by using the remote control system



This new Systems Operations Center of the Jersey Central Power & Light Company keeps in touch with remote stations through Bell System channels for telemetering and remote control.

Bell System communications help Jersey Central regulate power transmission



Colored pegs in wall diagram indicate segments of line to be isolated for maintenance work.

Channels for telemetering and remote control enable the Jersey Central Power & Light Company to regulate power transmission every step of the way from generator to home, store and factory.

An engineer glances at the dials, which give him a running picture of the system and the changing demands he has to meet—information which has been brought to him by Bell System telemetering channels.

From his position, he switches loads, starts and stops generators and localizes failures—even at distant points—over a network of remote control channels provided and maintained by the Bell System.

If you would like to know more about how Bell System communications can help you, an engineer will be glad to survey your company's needs. There's no obligation. Why not call your Bell Telephone representative today?

BELL TELEPHONE SYSTEM

Private Line Telephone, Private Line Teletypewriter
Channels for: Data Transmission, Telemetering, Remote Control, Telephotograph, Closed Circuit TV

EARL S. Condon COMPANY
Engineering Representatives
• Burndy Engineering Co.
• Carma Manufacturing Co.
• Cole Electric Co.
• Lapp Insulator Co.
• P-W Industries, Inc.
• Pacific Oerlikon Co.
• Preformed Line Products Co.
• United States Rubber Co. Wire & Cable Division
3460 WILSHIRE BLVD. • LOS ANGELES 5, CALIF.
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NOW! DIG HOLES SET POLES HYDRAULICALLY!
• Work across obstacles . . . up hills . . . down ditches
• Control it from the cab . . . from the front . . . from the rear
• A single lever raises the self-storing derrick and digger
• Complete operation controlled with one double-acting cylinder
Hydraulic derricks and diggers, now furnished in complete kits, provide new safety features and working ease for telephone, utility and power line crews when digging holes and setting poles. Offered in three complete "packages" for handling poles up to 55' long. *Write for Bulletin H866.*
Distributed by: Am. Equipment & Body Co., Los Angeles 21; Robblee's Utility Equip. Co., Seattle; Truck Equip. Co., Denver; Utility Body Co., Oakland 7; Williamsen Body & Equip. Co., Ogden, Salt Lake City, Utah, Pocatello, Ida.; Douglas Hood Co., Portland, Ore.

TEL-E-LECT PRODUCTS INC. 10025 Minnetonka Blvd. Minneapolis 26, Minnesota

Emergency Lighting

(18) Automatic Safety Co., Box 67, Station C, Pasadena, Calif.

Virtually maintenance-free during nonoperating periods, this new emergency lighting unit reaches a new high in dependability, according to the manufacturer. A desiccated storage battery, with the electrolyte held in glass ampules above it, provides the energy during an emergency. A power failure affects a bimetallic strip which releases gravity actuated hammers. The hammers break the ampules containing the electrolyte which then flows into the battery, charging it almost immediately. The unit will operate six 100-w lamps or their equivalent for a half-hour.

Conductor Splices

(19) Burndy Engineering Co. Inc., Norwalk, Conn.

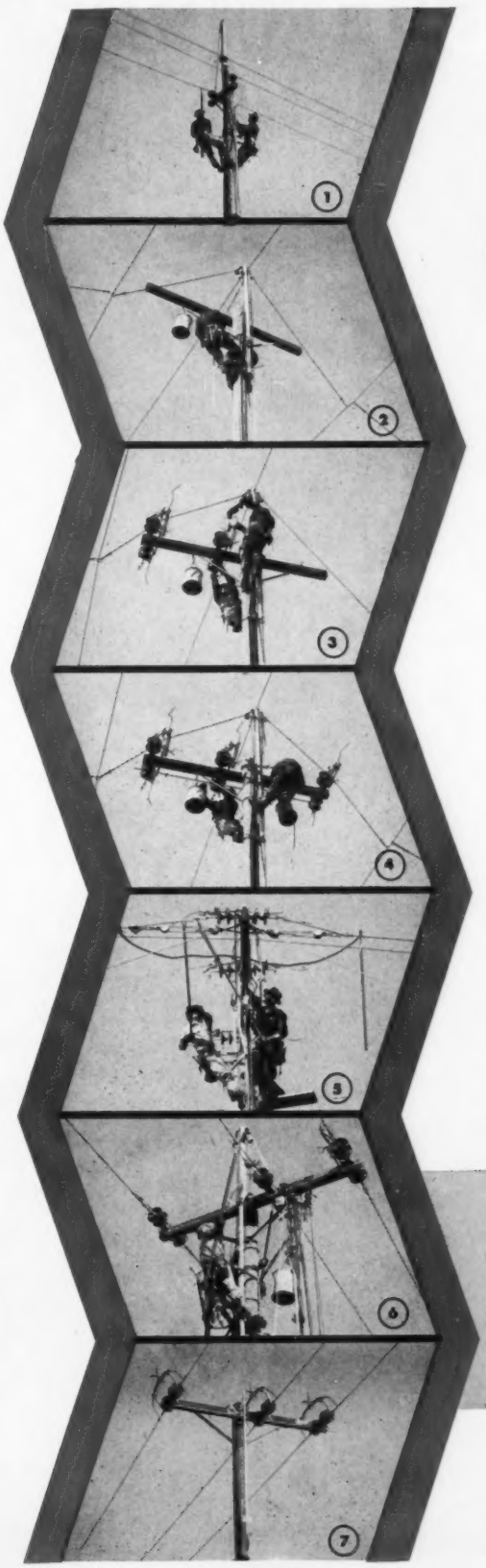
A new full-tension, one-piece Hysplice for AAAC, the new all-aluminum alloy conductor, has been placed on the market. Standard Burndy tooling is used for the new line of splicers, which are made of heavy-wall aluminum tubing.

Dead-End Clamp

(20) Paul S. Everley Co., 550 Ninth St., San Francisco, Calif.

This new dead-end clamp for guy wire and cable is said to replace four pieces of conventional hardware. Holding force comes from rollers in a tapered depression that locks against the cable. Can be used on span or down guys.

For more manufacturers' bulletins and coupon for use in securing them, see page 69.



22 KV HOT LINE SWITCH INSTALLATION

in less than 6 hours

A unique feature of KPF Air Break Switches is the ease with which they can be installed on hot lines. An important reason for this convenience is the simple design of KPF switches. They consist of two rigid dead end insulator assemblies with rigid jumpers forming the switch arms. One assembly is mounted stationary to the cross-arms. The other rotates to make and break the circuit. There are no complex parts to get out of order, require lubrication, adjustment or service. KPF switches serve indefinitely, are shipped ready for use requiring only bolting to the cross-arm and connection of conductors.

Pictures alongside illustrate a 22 kv hot line installation typical of those made regularly by leading power companies using KPF switches.

1. Line crew on job at 8:30 A.M. Gin pole installed and linemen start to untie and spread hot 22 kv line 3/0 copper. **2.** Line wires spread and new cross-arms installed for KPF switch. **3.** Switch being installed. **4.** Switch installed and adjusted ready to cut-in. **5.** Bypass jumper and blocks installed. Lineman about to deadend 3/0 copper into automatic deadend attached to KPF switch. **6.** Lineman lowering last conductor into position to be cut into switch. **7.** Switch complete and ready for operation. Time 3:10 P.M.

Get catalog, complete specifications. Write direct

KPF

AIR BREAK SWITCHES

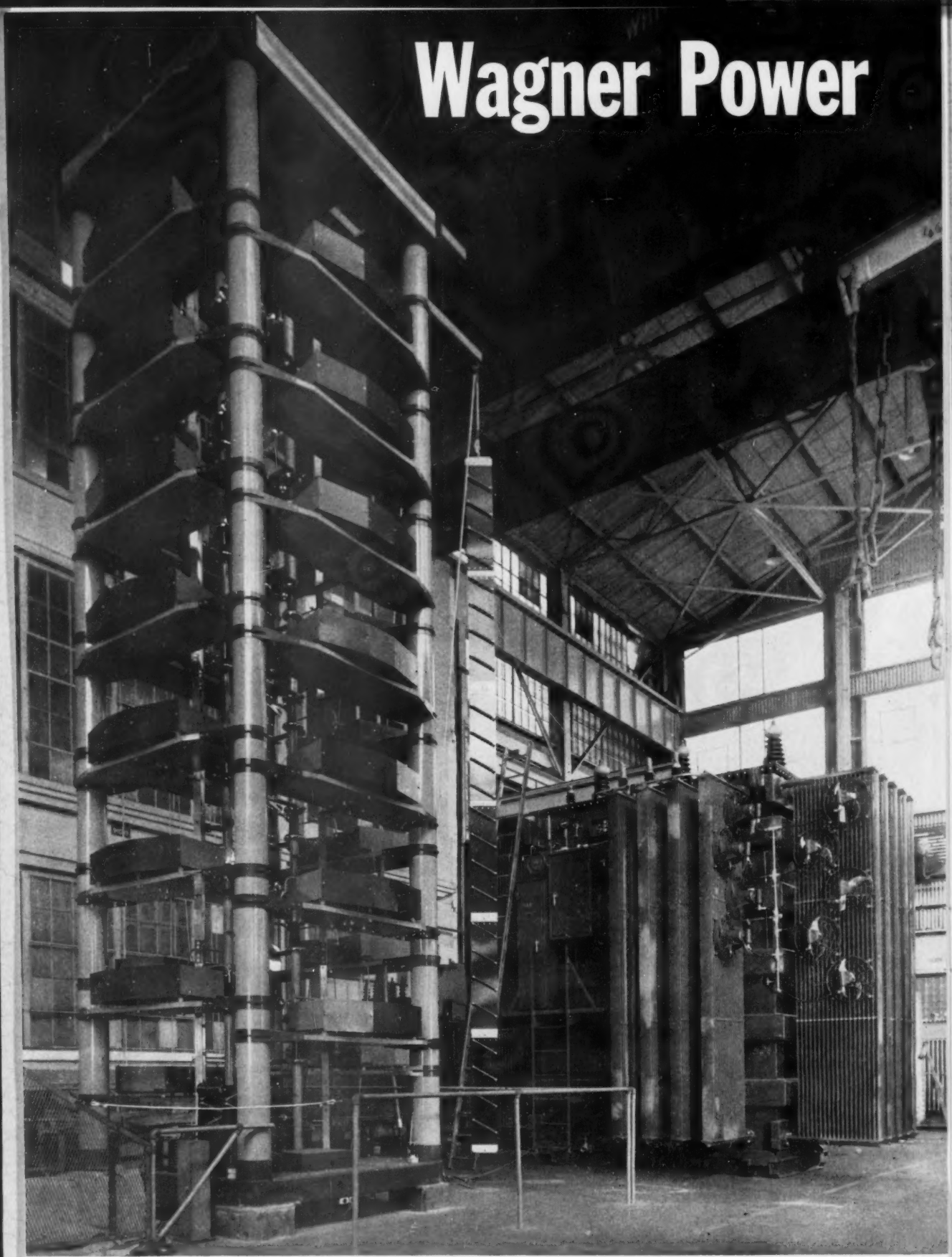
Standard for nearly half a century

KPF ELECTRIC COMPANY

DEPT. W • 1624 E. ALPINE AVENUE • STOCKTON 5, CALIFORNIA

3398

Wagner Power



Impulse test being given to a new power transformer in the Wagner transformer plant. The 3 phase, 60 cycle transformer under test is rated 20,000/25,000/33,333 Kva forced air cooled.

Transformers

Designed–insulated–and tested to handle heavy voltage surges for assured power continuity

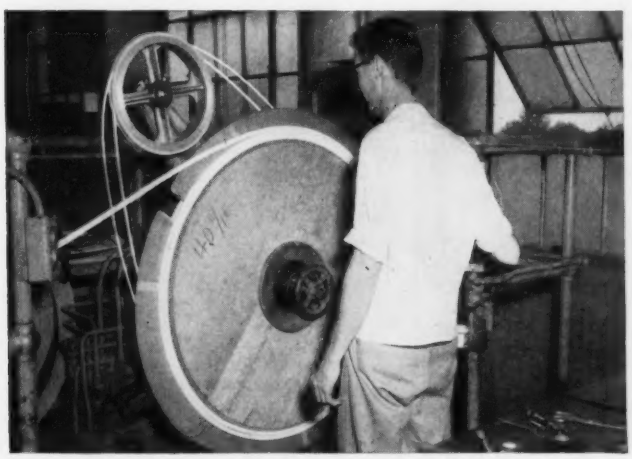
Wagner has been building power transformers for sixty-five years. The knowledge gained and the facilities acquired in all those years make the designing and building of fine power transformers part of the day's work at Wagner.

Wagner power transformers are designed and insulated to withstand practically any lightning or switching surge that might be encountered on a properly protected transmission line.

But, because heavy surges are the greatest enemy of transformer life, Wagner subjects every new design to rigid tests to make doubly sure that these transformers will provide the utmost reliability and service continuity.

Consult Wagner on your next power transformer installation. Thirty-two branches are at your service. Bulletins TU-180 and TU-181 give information on the complete line of dependable Wagner Transformers.

Buffer coils are used at the ends of the high voltage windings for Wagner power transformers. They protect against surges by absorbing the first impact of any line disturbance.



The two coils forming one double disk section of a high voltage buffer coil are wound at one time on the same machine.

The buffer coils have extra cable paper insulation on the conductor. Each section is individually wrapped with insulating tape.

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

BRANCHES IN 32 PRINCIPAL CITIES

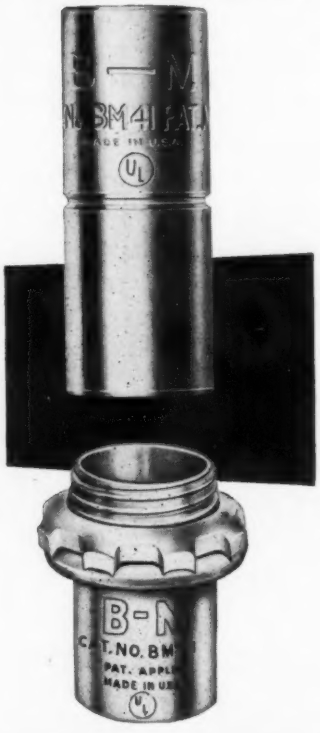
Wagner Electric Corporation
EST. 1891

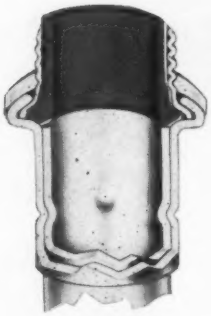
T36-11

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

B-M INDENTER TYPE FITTINGS FOR E.M.T. Concrete-tight

Red Throat
Insulated
Connector





Red Throat
Cross section

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job.

All B-M Indenter Fittings are U.L. Approved as concrete-tight and for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

UL

TELESCOPE BM SYSTEM

BRIEGEL METHOD TOOL CO.

GALVA • ILLINOIS

Warehouse Stocks in Principal Cities for Immediate Delivery!

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W. W. Wheat & Son
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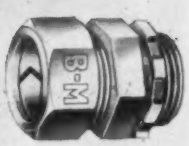
B-M COMPRESSION TYPE FITTINGS FOR E.M.T. Rain-tight



SIZES FROM ½" to 2"

SIZES FROM ½" to 2"

SIZES ½" ¾" 1"

SIZES ½" ¾" 1" 1¼"

SIZE ½"

BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

BULLETINS ETC.

(21) SHOPPING CENTER EQUIPMENT — "To Market—To Market" is the name of a 32-page booklet about electrical products used in shopping centers. The information is directed to power sales engineers and others interested in application of modern electrical equipment to the needs of shopping centers. Ask for B-6595, Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

(22) RADIANT CABLE — Coilheat Inc., 5212 Homberg Drive, Knoxville, Tenn., is offering a manual on its radiant heating cable.

(23) INSULATING MATERIALS—Recent development in polyethylene insulating materials are discussed in a booklet available from Bakelite Co., 30 E. 42nd St., New York 17, N. Y. Text is by R. J. Lurie and J. A. Snyder, development engineers with Bakelite.

(24) AIR CONDITIONING CONTROLS—Bulletin 5610 of Furnas Electric Co., 1082 W. McKee St., Batavia, Ill., describes new air conditioning and refrigeration controls in four control sizes, which are 20-30-35-50 amp. Furnas Electric is manufacturing an ampere size to match single and polyphase starter requirements for current rated motors through 550 v.

(25) CARBON STEEL TUBING—Two new technical booklets, TDC-142A and TB-412, deal with carbon steel tubing in applications involving heat transfer or condensing. They are available from Babcock & Wilcox Co., Tubular Products Division, 712 11th St., Beaver Falls, Pa.

(26) SMALL DRY TRANSFORMERS—Small dry-type transformers especially designed to remedy low-voltage conditions on air conditioning and refrigeration equipment are described in bulletin TR2 of Kolton Electric Mfg. Co., 123 New Jersey Railroad Ave., Newark 5, N. J.

(27) FIRST AID CATALOG—A new catalog on first aid equipment is available from E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif. With it comes a pocket-sized card called "Instant Guide to First Aid." More than 100 first aid kits for various industries are described in the catalog.

(28) NETWORK TRANSFORMERS — Operating features of Allis-Chalmers oil and Chlorextol liquid filled and sealed dry-type transformers are discussed in a new 24-page bulletin now available. Ask for bulletin 61B6152B. Address is 939 S. 70th St., Milwaukee, Wis.

(29) STAPLERS-TACKERS — The Industrial Fastener Division of Heller Corp., 2135 Superior Ave., Cleveland 14, Ohio, has issued two bulletins on tackers and staplers for the electrical industry. Both are fully illustrated.

(30) WIRING EQUIPMENT—Release of a new, complete line catalog (No. 156) and list price sheet (No. 256) is announced by Keystone Mfg. Co., 23328 Sherwood Rd., Center Line, Mich. Products are wiring devices and wiring installation equipment.

(31) MOBILE WEIGHT RESTRICTIONS — Four Wheel Drive Auto Co., Clintonville, Wis., is offering truck owners and operators a booklet of 1956-57 truck and trailer size and weight restrictions in the 48 states and District of Columbia.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after October 1

Please send me, without obligation, the new product information or catalogs:

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ELECTRA'S HUSBAND

"Interdependence Makes It Easy"

"HOW would you like to learn how to operate a power system on baling wire, army scrap and rice husks?" The voice on the telephone was that of a friend in the electrical manufacturing business who had just returned from Korea where he had been investigating market potentials of the Far East.

"It just might be worth the price of a lunch," I answered cautiously. "Why not meet me at the club this noon and we'll find out what you found out about the Orient."

"It's great to be back," said my friend as he sat down to the table. "A trip like that is good for your soul if for no other reason that it makes you realize just how easy and convenient it is to get things done here in the good old U.S.A." We ordered and my friend continued, "If most of us had to go through all the difficulties that the Korean power people have in getting kilowatt-hours to the customer, we'd probably go back to the farm."

"Things are always tough in a country that has just been through a war," I commented. "What makes Korea so different than any of the others?"

"Well, there are a lot of things. They have to import everything; the power system just can't keep up with the demand; the distribution systems are completely inadequate; and the shortage of competent technical personnel is really disheartening. Practically all of the switchgear, meters and protective devices on the system are in terrible shape and have to be replaced. The system power factor is so bad that there is a government directive requiring that every motor must have a condenser that will bring the power factor to more than 85% and every fluorescent lamp must have a capacitor on it to correct its power factor. The catch is that there are no capacitors and not much chance of getting any.

"The chief engineer of one of the three big companies that serve Korea gave me some figures on just how bad the material situation was. There are only 200,000 whr meters to serve 500,000 customers. They have only 10,000 primary cutout switches to protect pole-mounted transformers but they need 40,000 and most of the 10,000 that they do have were damaged during the war or need replacement. After all, they were made and installed by the Japanese. The same thing holds true for much of the oil circuit breaker equipment. The Koreans show what amounts almost to genius in an ability to keep things patched up and operating."

"From what you say, I don't think I would like to apply for the job of maintenance engineer," I said. "I imagine the customers have a pretty rugged time, too."

"I'll say they do. And even if they do get power, the distributing companies are frantically searching for a way to limit the amount. In the meantime they are seriously considering the use of a bimetal-operated circuit breaker installed in the transformer case to limit the primary current to as low as 2 amp. With more than half of the customers without watt-hour meters you can see that some method of controlling use is essential."

"If things are that bad, why don't they raise some long-term funds and start rebuilding the systems?"

"That's your logical, American sense of doing business coming to the front," my friend smiled, "but things aren't quite that simple in Korea. Two things stand in the way.

"In the first place, loan money is about the scarcest commodity in the country and there is terrific competition for it from the industrial plants and banking groups. This will make you shudder. The interest rate on bank loans amounts to something between 12 and 15%. If you want to borrow private capital, the rate is as high as 15% a month.

"But even if you could get the money in Korean currency, you're still not out of the woods because you have to buy everything abroad. There are just no electrical manufacturing facilities worthy of the name in the country. Now I'll admit they could buy equipment fairly cheap in Japan but most Koreans would rather do without than to have any dealings with their former occupiers. Therefore, everything has to come either from Europe or the U. S. And here's an interesting point: although prices for equipment in the U. S. are higher, it takes so long for delivery from Europe that the interest on the order during transit from Europe often makes a quick delivery from the United States more economical in over-all cost."

"That's a new angle," I admitted. "It looks like their best out is to develop a manufacturing industry of their own."

"They would like to but it would all have to be financed by foreign capital and, at least temporarily, staffed by foreign technicians. And then there are the problems of risk, finding some way to get profits out of the country, and all of the difficulties of working with government regulations and a rather primitive industrial economy. It's not easy to attract foreign capital under those circumstances."

"It's quite a problem," I agreed, "and I can see that it wouldn't be easy to try and operate a power system with that kind of background."

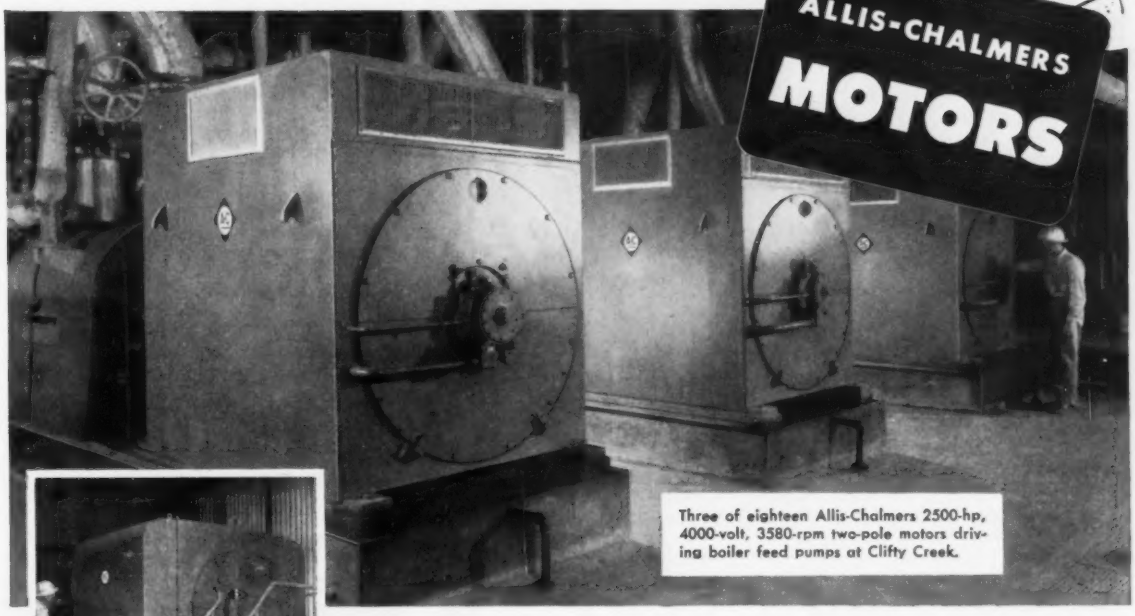
"I can see I'm getting my point across," my friend grinned. "That is to impress on you how important good manufacturing and service facilities are in making your job easier. Our Korean friends can't just pick up the telephone and order a distribution transformer. If something goes haywire there's no manufacturer's service shop within a few miles to take over a repair job. If you want to have a conference about some system problem, there's no staff of well-trained application engineers to call on and sit down to brief your people on the latest developments in that particular area. In fact, you'd have quite a time trying to pick up such simple items as a spool of enamel magnet wire, a pin-type insulator or a roll of friction tape. It might be good for you to meditate a little just how much the success of all of us here in this country stems from our interdependence on each other."

"All right, all right, you have made it sound grim enough. What do I have to do to atone for the privilege of living here among you manufacturers?"

"That's easy, just sign the check!"

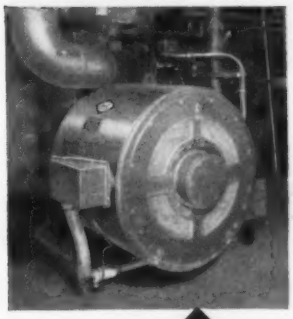
But I got in the last word this time. "Okay, I'll sign but some day I'm going some place where there are no customers. Then it will be your turn!"

Furnishing Major Auxiliary Drive Power at Indiana-Kentucky Electric Corporation's Clifty Creek Plant



Three of eighteen Allis-Chalmers 2500-hp, 4000-volt, 3580-rpm two-pole motors driving boiler feed pumps at Clifty Creek.

Rooftop installation of Allis-Chalmers 1500-hp, 4000-volt, 1185-rpm weather-protected motors. This is one of twelve Allis-Chalmers motors giving dependable service driving forced-draft fans at this modern new plant.



Allis-Chalmers 250-hp flange-mounted motor driving plant air compressor. This unusually economical mounting method for such a large motor can be attributed to Allis-Chalmers experience in motor applications throughout the electric power industry.

A wide variety of Allis-Chalmers motors furnish most of the major auxiliary drive power at Clifty Creek Plant near Madison, Indiana. Allis-Chalmers motors are driving plant air compressors, coal handling equipment, forced-draft fans, boiler feed pumps and many other pumps.

The Allis-Chalmers motors at this Indiana-Kentucky Electric Corporation installation are just a few of the complete line of motors Allis-Chalmers builds for power plant service. Contact the Allis-Chalmers district office in your area, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for complete information. A-4956

Now, You Can Get Even Greater Winding Protection with SILCO-FLEX

all-silicone-rubber motor insulation. Available only on Allis-Chalmers motors — in many of the larger sizes. Ask your A-C representative for the facts about this revolutionary new insulation system.

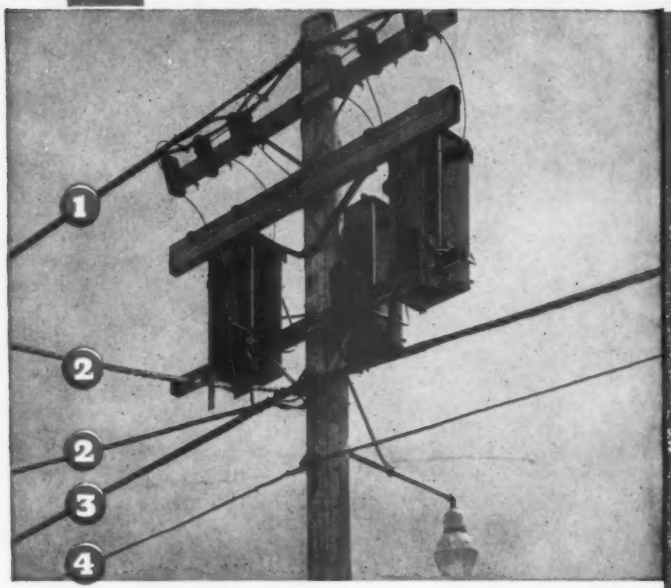
Silco-Flex is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

4 applications for OKOLITE-OKOPRENE *aerial cables*

. . . with these 16 advantages



1—PRIMARIES, 2—SERVICES, 3—SECONDARIES, 4—LIGHTING CIRCUITS—all on one pole at Bonneville, Oregon.

- Most utility engineers now recognize the advantages of aerial cables for primary circuits. Moreover, many are now using this economical cable design for street lighting circuits, for secondaries—including networks—as well as for service drops. For such installations, time-proved Okolite-Okoprene aerial cables—whether self-supporting, ring-supported or spinner-lashed—offer many advantages.

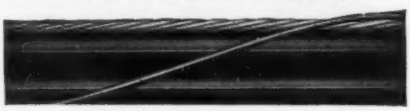
The patented Dualay* assembly, originally designed by Okonite engineers for hot-tapping of Okolite-Okoprene self-supporting primary cables, is also of distinct value for secondary circuits, since services can be taken off at any point, even in mid-span, without racks or spreaders.

In addition to their suitability for utility overhead systems, Okolite-Okoprene aerial cables are extensively used by industrial plants and railroads for power, lighting, communication and control systems. Details on the many types available, with complete data on selection and installation, are available in Bulletin WE 1074. The Okonite Company, Passaic, N. J.

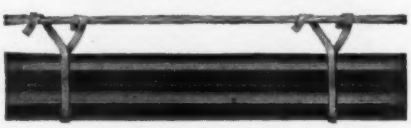
*Hot tap feature: in the Dualay method (U.S. Pat. 2,430,378) the insulated conductors are twisted together so that the direction of lay is reversed at regular short intervals to permit conductor separation without cutting the copper or performing any operation on the messenger.

- **Improved circuit regulation and lower voltage drop through lower reactance.**
- **Tree trimming reduced or eliminated.**
- **Overlength poles not needed to clear treetops.**
- **Fewer service interruptions or outages.**
- **Reasonable original cost.**
- **Lower maintenance cost.**
- **Simple to install.**
- **Higher safety factor for linemen, people and property.**
- **Good appearance.**
- **No festooning.**
- **Long spans.**
- **Less congestion on poles.**
- **Elimination of cross-arms.**
- **Reduced clearance space near buildings and other structures.**
- **Greater reliability in storms—resist wind, icing, moisture—operate even if poles are down.**
- **Messenger serves as neutral.**

Okolite-Okoprene *Self-Supporting* Aerial Cable with in-built messenger. Made with Dualay* design for easy tapping.



Okolite-Okoprene cables can be lashed to messenger by the *spinner method*.



Okolite-Okoprene cables may be installed in regular *messenger rings*.

Available with either copper or aluminum conductors

OKONITE OKONITE SINCE 1878 ***insulated cables***

3229

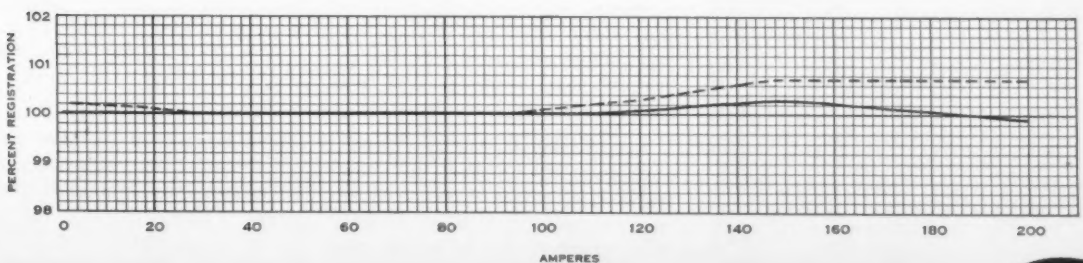
...match your 200 ampere service entrance equipment with Sangamo J2 meters

With bigger and bigger loads to handle every day, it makes good sense to match full service entrance capacity with watthour meter capacity.

Sangamo J2 50-ampere nameplate rated watthour meters have straight-line accuracy up to 200 amperes.

Torque characteristics of the 50-ampere J2 are high ... 74.0 mmg. at nameplate rating. Average starting watts are low—only 18 watts. Just twice the starting watts of the J2 15-ampere meter.

The straight line accuracy of the J2 50-ampere single-phase will meter your "full use" customers' loads even if their demand goes to 48 KW. Take a look at the chart at the bottom of this page.



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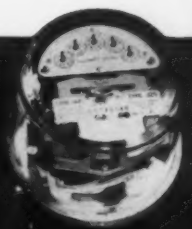
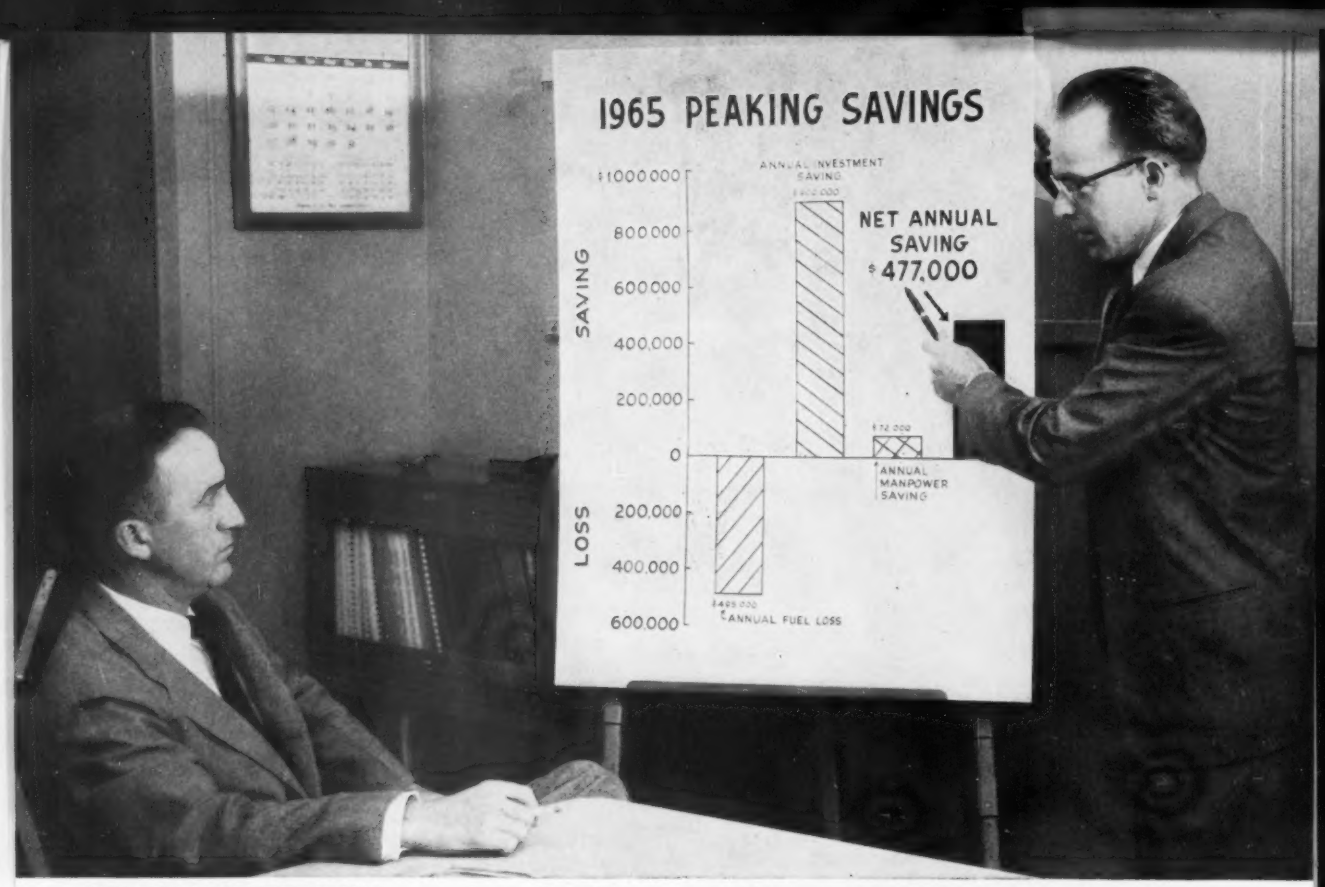
SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS





RECENT PEAK LOAD STUDY RESULTS are pointed out by W. D. Marsh, Power Generation Engineer, to J. R. Casey, Manager—Marketing of G.E.'s Gas Turbine Department. Study covered a typical 1,000,000-kw utility system having average load characteristics and steam station fuel cost of 30 cents per million BTU. Gas Turbine stations contained three 25,000-kw units burning 70 cents per million BTU distillate oil. Although fuel cost was higher using gas turbines, savings in investment and manpower more than offset this, giving by 1965 a net savings of $477,000 per year.

ARE YOUR PEAK LOAD COSTS TOO HIGH?

INCREASES IN GAS TURBINE RATINGS, noted here by C. M. Wright (left), Gas Turbine Manager—Electric Utility Sales, and W. J. McLachlan, Manager—Engineering Planning & Development, offer electric utilities greater incentive for their use in peak load applications. 21,800-kw unit model is shown.

New study shows that gas turbines may be the most economical answer on many systems

The long-sought solution to the electric utility problem of how to serve short-term peak loads most efficiently may well be crystallizing, according to a recent General Electric study. Preliminary investigations show promise of reducing gas turbine generation station first costs to $100 per kw or less.

As the rate of peak load growth continues to quicken on many systems, a review of present practices in the light of these data indicates that it may be well to plan for future peak loads by installing low-cost gas turbines as a portion of new generating capacity.

In addition to low first cost, the inherent simplicity and compactness of gas turbines reduces operating labor costs from 25 to 50%. And, the gas turbine is easily adapted for unattended operation which can still further reduce operating costs. Fast start-up, low maintenance, and the absence of standby losses also contribute to operating economy and provide ideal flexibility for peak load service.

For further information contact your local G-E Apparatus Sales Representative. A copy of the new study, "Gas Turbines for Peak Load Generation on Large Utility Systems," can be obtained by writing to General Electric Co., GER-1197, Schenectady 5, N. Y.

301-324

MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 117, NO. 2 AUGUST 1956

California embarks on a state-wide $12 billion water utilization program of unprecedented concept to transfer massive supplies of surplus runoff nearly a thousand miles to bring . . .

Water for 40,000,000 People

Nine years ago the state engineers of California were directed to study the ultimate development of all of that state's water resources. The result is a three-volume "California Water Plan" which is now being readied for presentation to the state legislature late this year. The plan outlines a gigantic $8.6 billion aqueduct system that would export more than 21,000,000 acre-ft of the surplus runoff from the streams and rivers in the mountains of northern California to the semiarid regions of the southern half of the state. In size and scope the plan is unprecedented in the history of mankind. The completion of even some of its more basic elements will be recorded sometime during the 21st century. It is an "ultimate" plan predicated on the needs of 40,000,000 people, three times the present population of the state.

Water Needs

The present population of California requires in excess of 21,000,000 acre-ft per year for all purposes. Of this amount about 19,000,000 acre-ft are required for agricultural irrigation. When the population reaches the 40,000,000 mark, water requirements are expected to total about 50,000,000 acre-ft annually, of which 41,000,000 will be required for agriculture.

At the present time, practically all of the state's water supply is secured from local sources with the exception of the Colorado River water imported over the Metropolitan Water District system and the All-American Canal. (California's rights in and to the waters of the Colorado River total 5,362,000 acre-ft annually.) Part of this present supply of 21,000,000 acre-ft is made up by overdrafts of 5,000,000 acre-ft annually by irrigation pumping on the underground water basins of the state. This has resulted in progressively lowering the water level and the raising of irrigation pumping costs.

Water Distribution

The mean seasonal runoff of the California streams and rivers of approximately 71,000,000 acre-ft, together with the State's Colorado River rights, will be ample to provide the quantity of water required for the ultimate development envisaged. However, the geography and nature combine to complicate the problem of providing water when and where needed throughout the year. Well over 70% of the stream flow in the state occurs north of a line drawn roughly east and west through Sacramento. Furthermore, most of this runoff occurs in a very few months during the early part of the year. In contrast, 80% of the forecast ultimate requirements for water is to be found south of that same line (see Fig. 1) with a high percentage requirement in the southern San Joaquin River Valley and the south coastal region of the state embracing Los Angeles and San Diego.

The problem, then, becomes one of storing and transporting massive quantities of water from the extreme northern region of the state to distributing points as far south as San Diego. Methods by which this could be accomplished are outlined in the California Water Plan.

The Plan

Backbone of the plan is the California aqueduct system, which would involve the construction of 33 major reservoirs totaling more than 48,000,000 acre-ft of capacity and yielding about 21,000,000 acre-ft of water annually from northern California surpluses for transport to the south. Transport is accomplished by a complex arrangement of conduits, pumping plants and river channels. It is envisaged that there would be a double water course from just below Shasta Dam to a terminus near San Bernardino in addition to the already authorized Feather River project aqueduct that will provide a third conduit from central California into the Los Angeles area.

The aqueduct system in northern California from Shasta Dam to the delta area would require use of the Sacramento River and the construction of 167 miles of conduits having a terminal capacity of 18,000 cfs. Dual conduits, augmented by a series of pumping stations, would parallel the Feather River project aqueduct down the west side of the San Joaquin Valley and continue across the Tehachapi mountain barrier in southern California for a distance of 360 miles with a lift to an elevation in excess of 3,000 ft. This would bring the water into the southern California area where some 400 miles of additional conduit lines would be required for distribution in that area.

Supplementing this aqueduct system would be approximately 240 reservoirs yielding nearly 14,000,000 acre-ft that would be needed to augment local supplies to provide for the ultimate needs throughout the state. Including the Feather River project, the reservoirs of the system would have a total storage capacity exceeding 60,000,000 acre-ft, which would be added to the presently available 20,000,000 acre-ft in existing reservoirs.

Power and Pumping

Utilization of the falling water under the proposed system would provide generating facilities having a total capacity of about 7,000,000 kw and a seasonal production of about 32

billion kwh. On the other hand, pumping installations required to transport the quantities of water involved in the ultimate program would require some 12,900,000 kw of installed pumping capacity and seasonal energy requirements of about 56 billion kwh. Approximately 40% of this latter amount would be required for transporting water into the southeastern desert area of the state which, at best, is an extremely long-range economic probability. Most of the power produced would be generated in the extreme north coastal and Sacramento Valley areas while the major pumping requirements would be in the southern areas of the state, particularly for the lifts over the Tehachapi Mountains area. In all, the system would provide for the transport of 21,000,000 acre-ft of surplus water from areas north of Sacramento to the central and southern regions of the state.

The plan when fully implemented would increase the presently irrigated agricultural area of the state from 7,300,000 acres to more than 19,000,000 acres.

Pattern not a Program

"The California Water Plan is a flexible pattern into which definite future projects may be integrated in an orderly fashion with due consideration to varying interests." This statement from a Preview of the California Water Plan, published by the State Water Resources Board, emphasizes what is likely to be a very popular attribute of the plan. The plan is designed to be susceptible of orderly development by logical, progressive stages as the growing demands and requirements for water in various areas may dictate. It is designed to include or supplement, rather than supersede, existing water resource development works and it also incorporates certain of the planned works now proposed or authorized by public or private agencies and individuals. As proposed, the plan would permit development of local or regional resources by irrigation districts, municipalities, public- or investor-owned utilities and industrial plants. As such, it would provide for future beneficial uses of local water reserves by individuals and agencies in all parts of the state.

Under the plan, all hydrographic areas would ultimately be developed to the maximum practical extent. Local water requirements would be fully satisfied first. Exports from areas of surplus would be excess waters over and above those required to meet local needs. Imports into water-deficient areas would be limited to the amounts needed to supplement locally developed supplies in such areas.

This great flexibility in concept of the plan makes it possible to integrate, in an orderly manner, all hydraulic developments required for local needs as well as providing the facilities for exporting surplus waters to deficient areas through the aqueduct system.

The Feather River Project

Unit No. 1 of the California Water Plan is the Feather River project authorized by the state legislature in 1951. It is the first state-wide project ever proposed in California and is designed to export water from the Sacramento and San Joaquin Valleys into the southern California area. Basic elements of this project include a 730-ft-high dam on the Feather River in northern California near Oroville and an aqueduct that would pick up water from the Sacramento-San Joaquin River delta region for transport south to the Los Angeles-San Diego area. Its cost is estimated to be $1.6 billion and the reservoir capacity behind the dam would be 3,500,000 acre-ft.

Inflow to the central delta area of California from the San Joaquin and Sacramento Rivers, including 2,800,000 acre-ft of water regulated by the Oroville Dam of the Feather River project, would total nearly 20,000,000 acre-ft annually. The Feather River aqueduct would pick up about 4,000,000 acre-ft at that point for export to the San Francisco Bay area, the southern San Joaquin Valley and southern California area.

From this amount it would supply 240,000 acre-ft for irrigation, municipal and industrial use in the San Francisco Bay area, 1,800,000 acre-ft for irrigation in the San Joaquin Valley and about 1,800,000 acre-ft (a continuous flow of 2,500 cfs) for the cities and crop lands in areas south of the Tehachapi. Part of these latter waters would be available by 1976 when approximately 25% of the total could be brought in. It would be 1991 before the full amount could be transported.

At Oroville Dam the falling water would produce approximately 440,000 kw of power of a dependable capacity and would produce 1.7 billion kwh of energy.

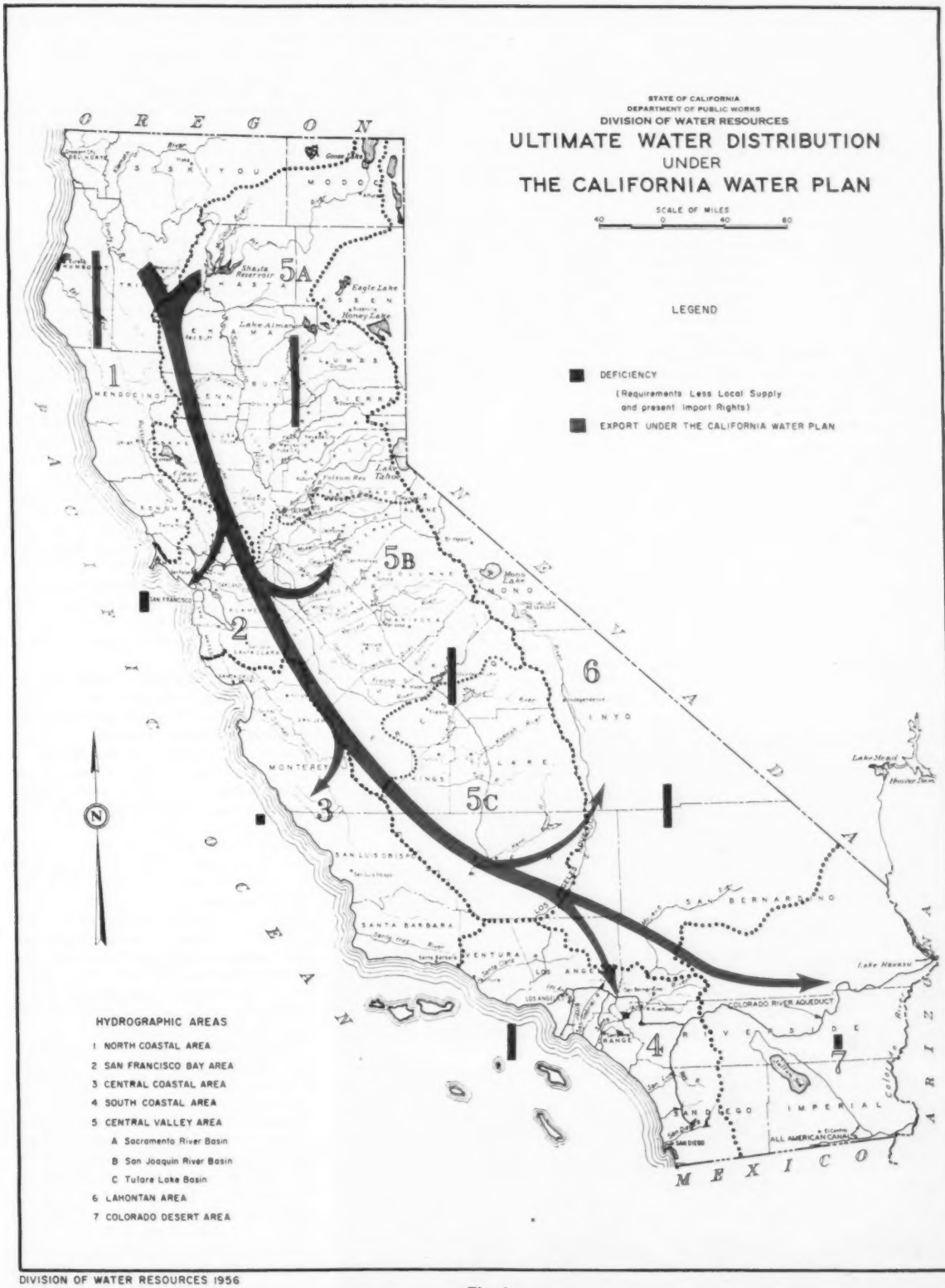
Net Power Negligible

Probably the most significant aspect of the California Water Plan, from the standpoint of the electrical industry, is the fact that the remaining undeveloped hydroelectric resources of the state would be insufficient to provide the pumping energy required for the complete fulfillment of the water plan. As previously mentioned, the ultimate development of the water resources would permit the development of 7,000,000 kw of hydroelectric generating capacity with a seasonal production of 32 billion kwh. At first glance, it would appear that this energy supply would fall far short of meeting the plan's total annual requirement of 56 billion kwh. However, the report states that 22 billion kwh have been included in the estimated requirements "for conveyance of water to certain distant desert areas, the development of which cannot be foreseen at the present time." Without this power requirement, which will not have to be met until far into the future, if at all, the energy for supplying pumping load along the aqueducts of the remainder of the plan would be reduced to 34 billion kwh. This seasonal requirement is more in line with the energy supply which could be produced by the hydro plants proposed in the plan.

The mere fact that the plan's hydro energy supply could meet the foreseeable pumping requirements with a relatively small deficiency does not tell the whole story. The plan gives consideration to the timing of hydo production and pumping use from the standpoint of over-all physical operation as well as maximum financial return from power.

The proposed hydro plants, even despite the large water storage and regulatory capacities proposed in the plan's numerous reservoirs, would not always be able to supply energy to the pumps in the amounts and at the times required. Moreover, maximum revenues from hydro production are obtained by generation and use of power during peak periods when power has its greatest market value. This latter consideration suggested this principle (in relation to power) upon which the plan is predicated: the maximum generation of power during peak periods and the maximum use of power for pumping during off-peak hours. (A specific example of this principle in the case of the Feather River project is discussed below.)

Even if it were not necessary to obtain additional energy to make up deficiencies in supply, the timing of supply with demand for best operation, the marketing of on-peak hydro energy to obtain maximum financial aid for construction of irrigation works, and the use of low-value off-peak energy to minimize costs would require the integration of the plan with other power sources. California already has large, well-integrated generation and transmission systems that essentially blanket the entire state. Because of the characteristics of the operations and the physical facilities of these power systems, they can provide benefits of coordination which will help achieve optimum development of the state's water resources. Fortunately the historical relationships be-


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
ULTIMATE WATER DISTRIBUTION
UNDER
THE CALIFORNIA WATER PLAN
SCALE OF MILES
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LEGEND
DEFICIENCY
(Requirements Less Local Supply and present Import Rights)
EXPORT UNDER THE CALIFORNIA WATER PLAN
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NEVADA
ARIZONA
MEXICO
PACIFIC OCEAN
HYDROGRAPHIC AREAS
1 NORTH COASTAL AREA
2 SAN FRANCISCO BAY AREA
3 CENTRAL COASTAL AREA
4 SOUTH COASTAL AREA
5 CENTRAL VALLEY AREA
A Sacramento River Basin
B San Joaquin River Basin
C Tulare Lake Basin
6 LAHONTAN AREA
7 COLORADO DESERT AREA
COLORADO RIVER AQUEDUCT
ALL AMERICAN CANAL
DIVISION OF WATER RESOURCES 1956

Fig. 1

tween water and power agencies have been those of mutual cooperation leading to maximum beneficial and economic uses by the state's water and power users.

A History of Partnership

Power partnership policies are not a new concept in California. Past development of irrigation and municipal districts in the San Joaquin and Sacramento Valleys early posed the problem of the most economic utilization of the hydroelectric potential resulting from release of stored waters in the High Sierra. Partnership to accomplish this has taken two principal forms.

In the first instance, electric utility companies and districts have agreed on a price for falling water and the companies have installed power plant facilities at their own expense with district water storage projects. Payments by the companies for the use of the water have helped the districts finance their projects. This procedure is illustrated by the Melones plant of Pacific Gas and Electric Co. on Stanislaus River, utilizing water from a reservoir of the Oakdale and South San Joaquin Irrigation Districts. It has the advantage of wholly integrating the power-producing facilities into the electric system of the purchasing utility and produces maximum tax return to the various counties and other local taxing bodies in which plant, transmission and substation facilities are located.

A second method involves the purchase by a utility of either firm or surplus electrical energy at the bus bar of a hydroelectric generating station built by an irrigation district or municipality as an adjunct of its water development program. An example of this is found in an agreement between the East Bay Municipal Utility District and PG and E covering the by-product power produced at the district's Pardee Dam power plant on the Mokelumne. Another example is a PG and E agreement with the Oakdale and South San Joaquin Irrigation Districts for purchase of power from the district's Tri-Dam project now under construction on the Stanislaus River.

An instance of partnership with a federal project is found in Hoover Dam, where the generating facilities built by the government are operated by the Los Angeles Department of Water & Power or the Southern California Edison Co. for their own account or as agents for four other assignees of project power at rates designed to repay all project costs in full.

In connection with the Central Valley Project, PG and E has coordinated the use of power from the Shasta, Keswick, Folsom and Nimbus plants with its own generation to make firm all dependable power capacity and purchases any power remaining after the Bureau of Reclamation serves its own customers.

A pending partnership proposal in California is that of PG and E to construct and operate the power facilities of the Trinity River project now under construction by the Bureau of Reclamation as part of the Central Valley Project.

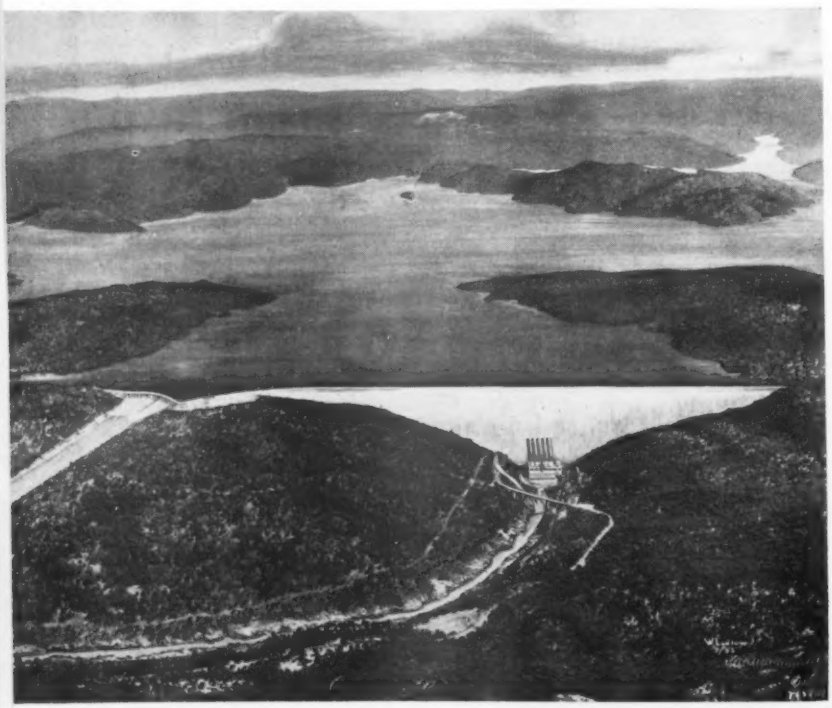
Feather River Proposal

The analyses of the financial feasibility of the first unit of the California Water Plan, the Feather River project, were made on the basis of a particularly fine example of the partnership principle, which could set the pattern for the electric power aspects of future components of the plan.

On this basis, the energy produced by the project and the energy requirements for pumping would be coordinated through the facilities of the existing utilities. PG and E has estimated the value of the power produced at Oroville Dam on the basis of the unit cost of producing and delivering equivalent power from a modern, company-owned steam plant located in the delta area. Southern California Edison Co. has done the same for plants that may be constructed in its area.

The Bechtel Corp.'s report on the Feather River project to the joint Committee on Water Problems of the State Legislature says the optimum power plan consists of (1) selling all dependable hydro power during on-peak hours so as to realize highest revenue of about 8 mills per kilowatt-hour, and (2) purchasing as much power as possible at off-peak hours to get lowest net rates of about 4 to 5 mills per kilowatt-hour. Although designing the system to use as much off-peak energy as the hydrology permits involves extra capital investment, the annual energy cost savings soon recover the extra investment and this plan of procedure consequently reduces the total annual charges, the report observes.

By this scheme a net saving of more than $20,000,000 in annual pumping costs would be possible. It should be pointed out that such an arangement, whereby the electric utilities buy firm power at firm power rates and sell pumping power on an off-peak schedule, would only be possible where geographically large, and electrically highly integrated, power systems are available and where a large energy market exists. (See Fig. 2.) It is also noteworthy that the proposed off-peak pumping plan may well become even more desirable if nuclear power stations of any size become economically



Artist's view of Oroville Dam, main feature of the Feather River project in California

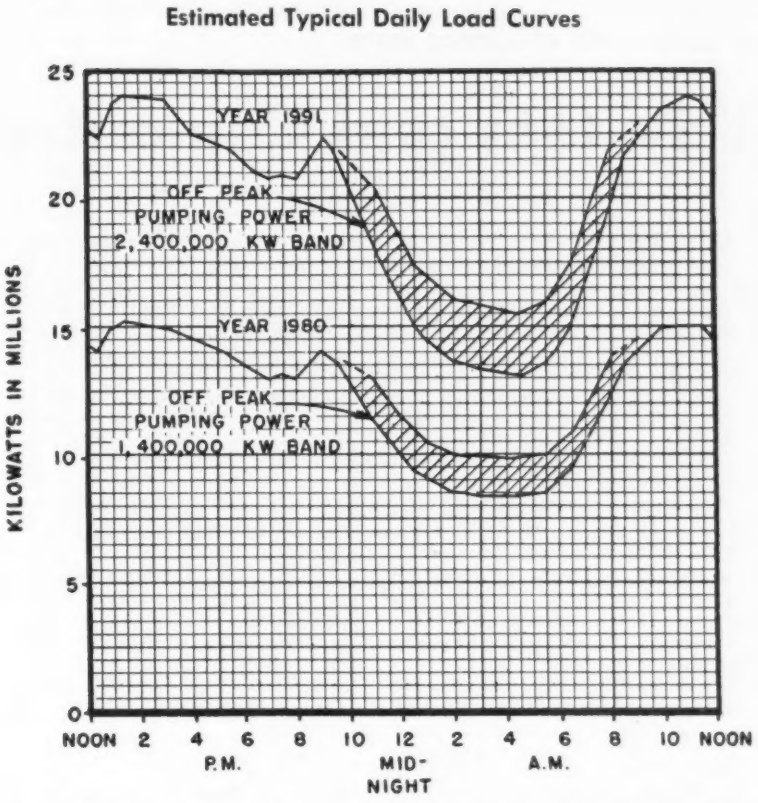


Fig. 2—Taken from the Bechtel Report on the Feather River project, these curves show off-peak capacity of existing electric systems available for project pumping in 1980 and 1991. Projected summer weekday loads are based on existing daily loads. Off-peak pumping power loads that might be expected are shown by shaded areas. In 1980 daily load demand dips from 15,000,000 to 8,500,000 kw, leaving in an average day about 7,500,000 kw to meet pumping demand of 1,400,000 kw. In 1991 daily load demand dips from 24,000,000 to about 13,000,000 kw, leaving about 11,000,000 kw for pumping demand of 2,400,000 kw. This demand would be only about 22% of the available unused capacity

feasible by the time the pumping load develops.

Perhaps the best evidence of the benefits of partnership is presented by comments taken from the Program for Financing and Constructing the Feather River Project, produced by California's Department of Public Works. Concerning the sale of power (the original plan contemplated state-owned transmission facilities from the Oroville Dam to the delta area), the report says: "The cost of transmission facilities to load center is directly reflected in the rate that has been submitted for general power delivered to Tracy. Studies made indicate that there is a financial advantage in the above rates for power based on delivery at the high-tension side of the Oroville power plant over that for delivery at the load center near Tracy. The annual charges on a transmission system from the Oroville power plant to the vicinity of Tracy would be in excess of the difference between the revenue using the higher rate for power delivered near Tracy and the revenue with delivery at the power plant. In view of the net gain to the revenues of the project by omitting the transmission system from the financial analyses presented herein and the reduction in the capital requirements of about $22,000,000, the transmission system has not been included."

This report further states that: "It should be pointed out that, under full project operation, the need for power for pumping at the project pumping plants would be five times the amount generated at the Oroville power plant. It is necessary, therefore, to realize the fullest capability of the Oroville power plant, which under the proposed operation would yield a very high quality of power. This power, if sold at its true value, would provide a substantial credit against the power bill for pumping which will be based on the use of lower cost power, which it is contemplated could be supplied by existing equipment of the power generating agencies in the region at the time it would be required."

Concerning this pumping energy, a quotation from the report concerning the Pastorial Creek pumping plant (lift 3,357 ft) to take the water over the Tehachapi is illuminating.

"Pumping plants Nos. 3, 4, 5 and 6 would be constructed to a sufficient capacity so that the pumping plants could be operated entirely on off-peak electric energy. It has been ascertained that the existing power agencies with facilities in the area, the Pacific Gas and Electric Co. and the Southern California Edison Co., could make available sufficient off-peak electric energy for project needs at the time water was delivered to southern California with available facilities. The capacity of the conduit and the pumping plants for the aforementioned lift would be about twice that required for water delivery on a continuous basis. The increased annual charges on capital cost for the works under discussion required by utilization of off-peak energy would be considerably more than offset by the reduction in the cost of power for pumping."

Conclusion

Approval of the proposed California Water Plan by the California legislature would merely crystallize the long-term planning aspect of water utilization in the state. Full implementation of the plan, by whatever agencies, may take decades and perhaps a century to accomplish. The over-all capital expenditures necessary for its ultimate completion are prodigious, being between $12 and $13 billion (at today's prices). This figure includes the cost of the already authorized Feather River project but not those for existing works or for any other authorized works presently in construction or in advanced preconstruction phases. Thus existing projects of the federal government, irrigation districts, municipalities and utilities are excluded.

It can be expected that much of the future costs of the California Water Plan will be borne by agencies and organizations whose local development of water resources will be integrated into the master plan. The plan is a bold attempt to insure adequate water supplies for future generations of water users in all of California. Participation of existing power systems and coordination with them in furtherance of the California Water Plan, as presently recommended for the Feather River project, provides the flexibility that will make it possible to utilize those resources for maximum benefit and economy of the present generation.

Edison will get fuel savings plus more efficiency from

New Control System and Computer

J. H. Drake
Chief System Operating Engineer
and
C. R. Canady
Senior Operating Engineer
Southern California Edison Co.

During 1957 Southern California Edison Co. will install expanded load-frequency control equipment plus a computer to determine the most efficient loading schedule for steam units. Result will be an anticipated fuel saving of $250,000 per year plus tangible and intangible operating and regulating efficiencies and advantages. This article explains the reasoning that induced the installation.

The customers of an electric utility determine at what time and at what rate electric energy must be produced to supply their requirements. This is true because electric energy cannot be stored in quantity and therefore must be produced at the rate of use.

An isolated power system (not interconnected with any other system or systems) uses frequency as a measure of the excess or deficiency of generation relative to prevailing load. Frequency-sensing equipment automatically increases or decreases generation as necessary to restore normal frequency.

In the case of an interconnection made up of two or more power systems, frequency is a measure of the difference between total generation and total load in the entire interconnection. Each individual power system, however, can derive its own "area requirement"[1] by metering all interconnections and mixing the net deviation from scheduled interchange with frequency in proper proportion. This article considers each system to be an "area."[2]

Control equipment in each area automatically raises or lowers generation as necessary to reduce the prevailing area requirement; thus, a balance between area generation and area load is continually approached. A generation change, which is made automatically to satisfy a load change, is initiated as a result of an existing area requirement. During periods when load is increasing the frequency tends to be slightly low, and this frequency error plus the net deviation from scheduled interchange is used to initiate the generation changes required in each area.

The regulating requirements of a large power area can be handled by a relatively small regulating plant, if the plant can be kept within regulating range by manual load changes made at other plants. As shown in Fig. 1, this arrangement is now used on the Edison system to satisfy customer requirements. Redondo steam plant No. 1, Hoover, or any Big Creek plant except Big Creek 8 can be used for regulating tie-line load or controlling frequency. Production considerations at the two hydro regulating locations dictate, at times, that the plants be operated at either maximum output or at an output approaching minimum load. For this reason Redondo No. 1, currently the only steam regulating location, is used extensively for regulation.

As the Edison system grows, it will become increasingly difficult to handle the regulating burden by using only one plant at a time for automatic control. At the present time the rate of sustained load change reaches 25 mw per minute, and is expected to reach 40 mw per minute about 1958. With present regulating facilities the bulk of required load pickup would have to be made manually under system dispatchers orders. In addition to keeping the regulating plant within regulating range, desired steam incremental loading schedules will be increasingly difficult to follow unless the present automatic control facilities are expanded to bring more plants under simultaneous control.

During system light-load periods it is presently necessary, at times, to reduce the total load on the newer high-pressure reheat steam generating plants by an average value of 100 mw

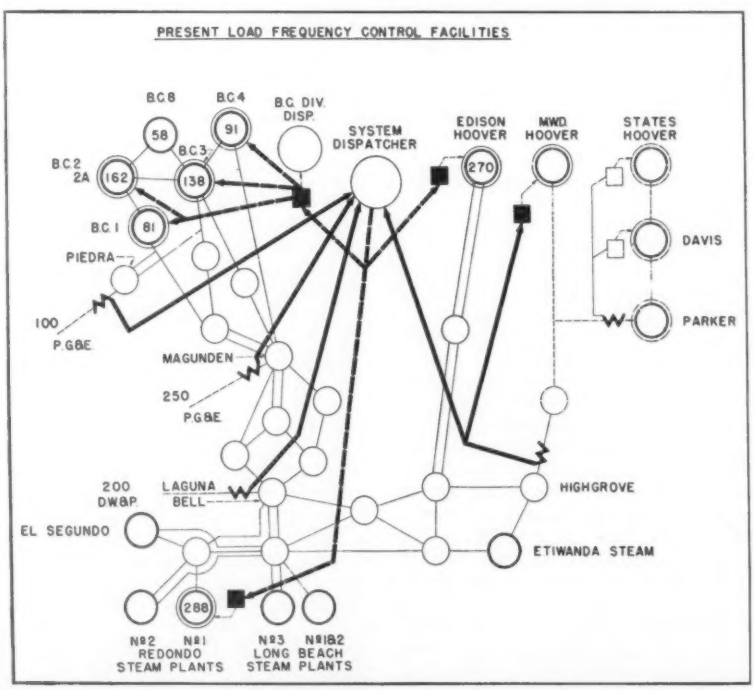


Fig. 1—Present load-frequency control facilities on Edison system permit tie-line load or frequency regulation from Redondo steam plants, Hoover or any Big Creek hydro station

(1) Area requirement is defined as a measure, in megawatts, of the prevailing area generation error. It is the amount by which area generation must be changed for the area to correct its net interchange and do its share of frequency regulation.

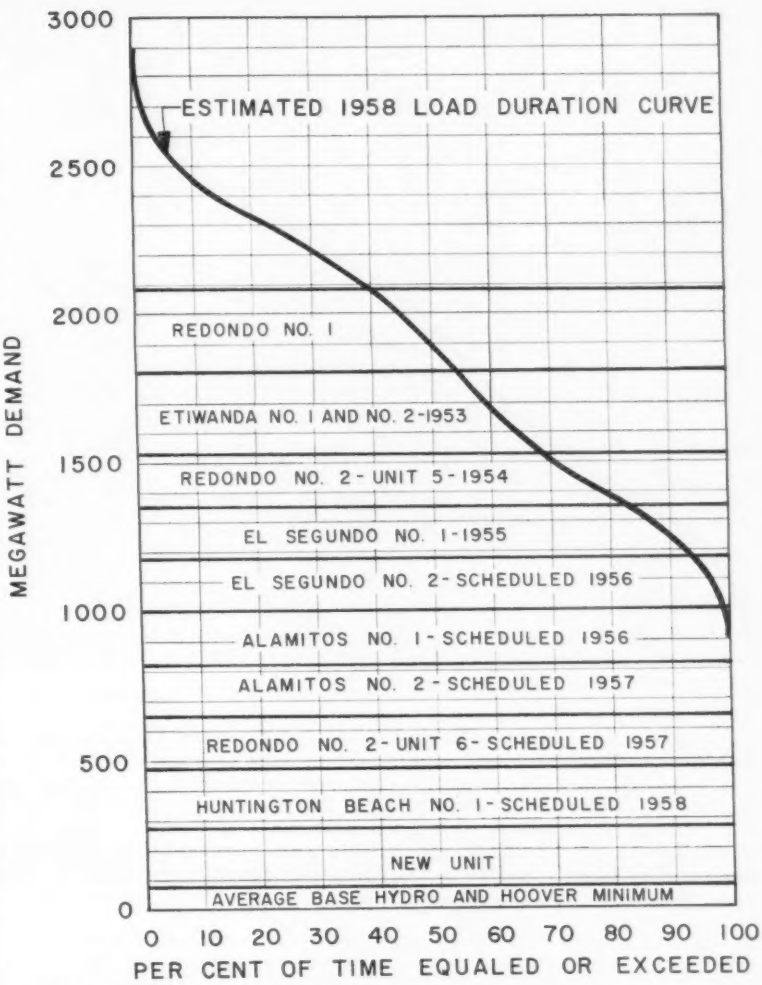
(2) An "area" is defined as a regulating entity on an interconnected system, which is expected to adjust its generation to follow its load swings and do its share of the interconnection's frequency control.

to provide Redondo No. 1 with regulating range. Fig. 2 shows an estimated load duration curve for the year 1958 superimposed upon generation sources which should, from an economic standpoint, be loaded ahead of Redondo 1. Considering hydro production requirements, particularly during the spring runoff, economic considerations dictate that Redondo No. 1, by the end of 1958, should be operating at minimum load at least one half of the time because of the large amount of future efficient reheat generating capacity to be installed on the system to meet system growth. Minimum load at Redondo No. 1 will be required during system light-load periods and at times when, in general, the Hoover hydro plant and the Big Creek project will be operating at either maximum or minimum load.

If Redondo No. 1 is the only steam plant capable of automatically absorbing load changes in 1958, it will be necessary to reduce average load on the newer Edison reheat steam plants during these periods by 100 mw to provide regulating margin for Redondo No. 1. It is estimated that the additional production costs required to provide such a margin would be at least $250,000 per year. The solution to this problem is to unload Redondo No. 1 and simultaneously regulate on a number of Edison reheat units during these system light-load periods. Since the megawatt per minute capability of the new high-pressure reheat units is considerably less than the smaller low-pressure non-reheat units, the regulating burden will have to be simultaneously spread among a number of units and plants to avoid exceeding the capability of any one plant or unit.

Another consideration is to provide a control system that will permit the Edison dispatcher to operate steam plants more closely in accordance with equal incremental production cost procedures. It is not presently possible to obtain optimum production scheduling at all times on the basis of telephone orders to the generating plants, particularly during periods of rapid system load pickup or drop. It is difficult to estimate the savings that can be achieved by more closely operating Edison steam plants in accordance with equal incremental production cost procedures. It is noted, however, that even a saving of ½ of 1% on present annual fuel requirements would save an additional sum in excess of $100,000 per year.

The last consideration that has made it desirable to plan an expanded load frequency control system is one of improved control action. In general, unrequired generation changes on either Edison system units or those of its neighbors are undesirable and can be costly. Net interchange type of operation for all electrical systems having control facilities in the Pacific Southwest Area is the only presently known method to theoretically avoid unrequired generation changes. It is impossible to avoid incorrect control action if any system in the Southwest area regulates frequency as such, as is done at the present time. The facilities that the Edison company plans to install in 1957 will provide for net interchange operation of the Edison area and will improve control action. It is planned to replace the present impulse-duration telemetering system, which has considerable time delay, with a variable-frequency telemetering system, which will greatly reduce telemetering time lags. Faster telemetering, which provides for rapid mixing of prevailing tie line loads with prevailing frequency to derive area requirement, will reduce hunting swings presently experienced over Edison interconnections. In this regard it would be desirable if other areas in the interconnection replaced tie load impulse duration telemetering systems.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MEGAWATT DEMAND
ESTIMATED 1958 LOAD DURATION CURVE
REDONDO NO. 1
ETIWANDA NO. 1 AND NO. 2-1953
REDONDO NO. 2 - UNIT 5 - 1954
EL SEGUNDO NO. 1-1955
EL SEGUNDO NO. 2 - SCHEDULED 1956
ALAMITOS NO. 1 - SCHEDULED 1956
ALAMITOS NO. 2 - SCHEDULED 1957
REDONDO NO. 2 - UNIT 6 - SCHEDULED 1957
HUNTINGTON BEACH NO. 1 - SCHEDULED 1958
NEW UNIT
AVERAGE BASE HYDRO AND HOOVER MINIMUM
0 10 20 30 40 50 60 70 80 90 100
PER CENT OF TIME EQUALED OR EXCEEDED

Fig. 2—This load duration curve for 1958 imposed on generating facilities then available shows the most efficient and economical loading as compared to Redondo No. 1

A simplified schematic of the proposed load frequency control system is shown in Fig. 3. It will be noted that tie line load on the Magunden, Piedra, Highgrove and Laguna Bell ties will be sent to the Alhambra dispatchers office as at present. At the dispatchers office area requirement will be derived and from this quantity individual station requirements will be determined and automatically sent to seven regulating locations. The planned control system will simultaneously regulate load on the units at a number of these control locations in accordance with production considerations.

If economic loading of generation is accomplished by following prearranged production schedules, it be-

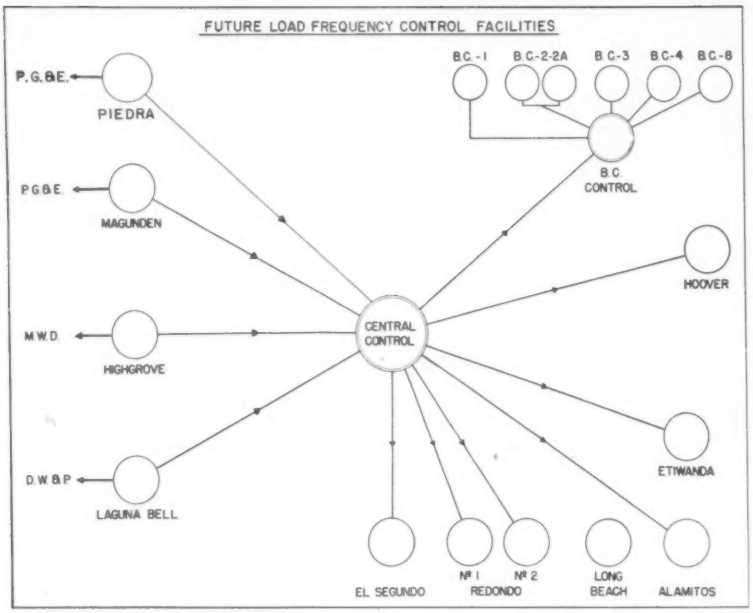


Fig. 3—Edison's new load-frequency control system will communicate tie-line loads (left) to a central control point which will be sent automatically to seven regulating locations

comes necessary to supply the load dispatcher with a schedule for each of the many conditions that may be encountered. Since the number of variables is continually increasing, it will become increasingly difficult to provide all of the schedules needed and to assure that an optimum schedule is selected. Recognition of these difficulties led to a decision to purchase a computer similar in principle of operation to the "Early Bird."

This computer will enable the Edison dispatcher to determine the most efficient loading schedule for steam units, thereby circumventing the use of incremental-production-cost slide rules or tables. The computer may also be connected directly into the control system to load generation automatically.

Since the computer can be disconnected from the load control equipment, it will be used to determine the worth of interchange energy with neighboring systems, and for the coordination of the Edison steam and hydro resources.

Initially the computer will not be equipped with a transmission loss matrix because the present steam plants are electrically near each other and transmission losses do not materially influence optimum production scheduling. Provision will be made to add a transmission loss matrix to the computer at a later date.

The basic features of the initial computer installation are as follows:

1. Control selector switch which permits operating the load-frequency control system from the computer or from the control console.

2. Each steam unit, which may be placed under automatic control, is represented by potentiometers which approximate the incremental heat rate curve by three straight line segments with adjustable slopes.

3. Fuel costs may be fed into the computer by means of separate adjustments provided for oil or gas fuel at each station.

4. Transmission loss factors may be set into the computer manually through the use of dials for "Incremental Percentage of Power Delivered" which are provided for each hydro source, steam plant, and interconnection.

5. The following indicated quantities can be read directly from meters on the computer console: (a) Tie-line cost (worth of power at interconnection points); (b) system incremental cost (cost of delivered power); (c) Delta P (shows generation change which should be made at each station when total system generation is increased by a given amount); (d) desired generation (stations and units); (e) total system generation; (f) total system load; (g) total steam generation; (h) Hoover generation; (i) Big Creek generation.

6. Jacks will be provided for external connection to an "X-Y" recorder which may be used to plot any of the quantities indicated on the computer meters. For example, "System Incremental Cost" can be plotted against "Total System Generation."

A summary of the anticipated advantages of the new control system and computer follows:

1. Fuel cost savings in excess of $250,000 per year resulting from regulation at reheat plants which will permit Redondo No. 1 to be loaded in accordance with economic consideration.

2. Unnecessary power swings over the interconnections will be reduced materially and unrequired generation changes on Edison units and other units in the interconnection will be minimized by improved control action.

3. The large amount of capacity under control will automatically satisfy large rates of system load changes in accordance with rigid economy considerations.

4. Regulating burden of any individual steam plant will be reduced, thereby improving stack appearance and plant economy.

5. The dispatcher will be provided with visual indication of plant generation and total system load.

6. Worth of interchange power can be readily determined and economic scheduling of generation accomplished with the computer facility.

Hi-Frequency Lighting in N. M.

First high-frequency, high-voltage lighting system in the West is being installed in the University of New Mexico's new gymnasium at Albuquerque. According to the consulting electrical engineer, Carl R. Albach of Santa Fe, N. M., it will be lighted by a new type of fixture, the first of its kind west of Schenectady, where a similar installation was made in the Union College field house.

The incoming 60-cycle current will be stepped up to 400 cycle and the voltage up to 600 v through special motor-generated sets. With this frequency and voltage, the lamps will increase 22% in light output over the usual 120-v operation.

Current consumption per lamp is so low that No. 12 wire is to be used for all of the high-bay branch circuit wiring. Ballasts are 80% lighter than the conventional type. Remote-control switching is being provided for the lighting in the main gym. With it the entire area can be lighted to 5 or 10 f-c. The main floor area can be switched to 30 f-c and the game area to 50 f-c. To simplify maintenance and relamping each fixture is to be equipped with lowering hangers.

The first two single-unit pulling machines ever manufactured help to speed the reconductoring of PG and E's Pit-Vaca Dixon line

New machines pull in, reel up at same time in

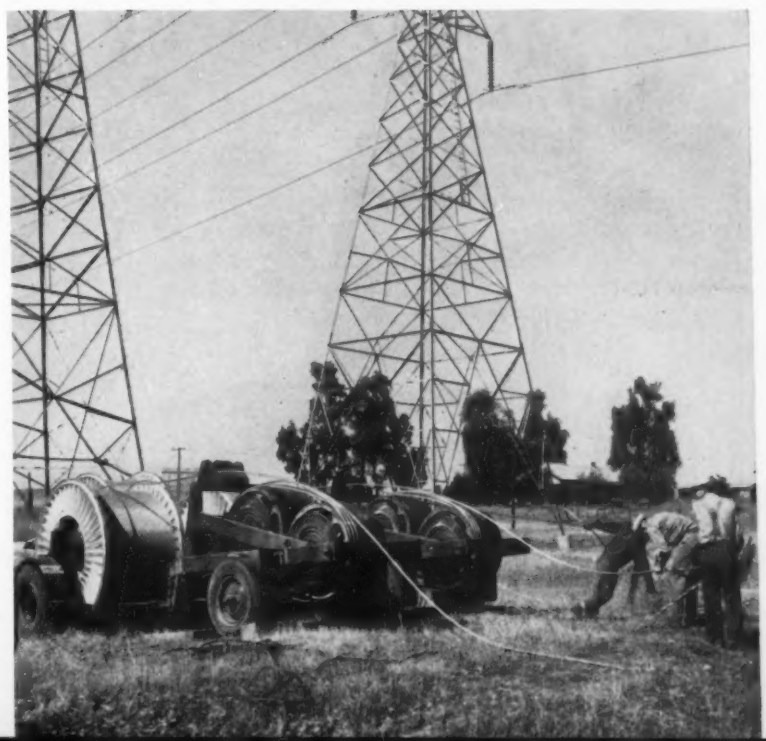
PG and E Reconductoring Job

J. H. McLean

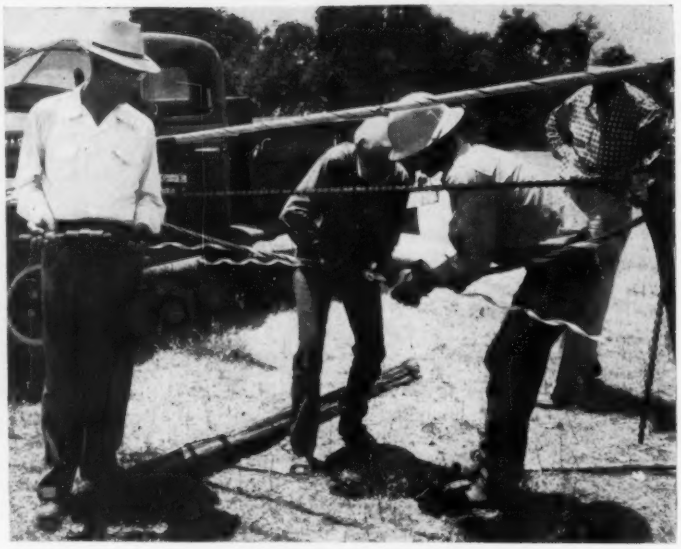
General Foreman, Construction Department
Pacific Gas and Electric Co.

For the reconductoring of its Pit-Vaca Dixon 220-v, double-circuit transmission line, Pacific Gas and Electric Co. has put into the field the first of two new pulling machines. These pullers are being teamed up with tension rigs at the pay-out end to keep the conductor off the ground while it is being pulled at speeds up to 4 mph.

The reconductoring project involves the replacement of about 7,000,000 lb of 500-MCM rope-lay copper conductor with 954-MCM 37-strand all-aluminum cable. The new conductor will practically eliminate the 4,000-kw corona loss of each of the present copper lines and has an I^2R loss of about half that of the copper. It is estimated con-



During stringing operation two tension rigs hold one or two cables each under tension; are fed by three cable trailers. All three trailers are dead-ended to the same pole



To speed the job, preformed steel guy grips (left) are used to splice the all-aluminum to the rope-lay copper. To protect travelers, original threaded splices were cut out and preformed steel splices (right) were used to join the copper for pulling

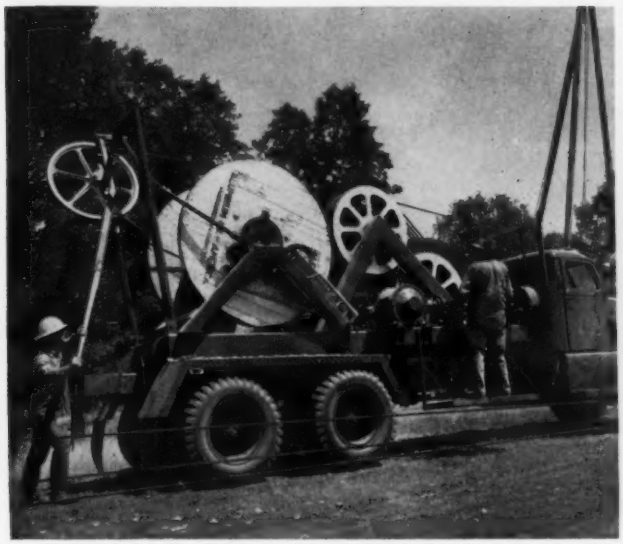
A 40-ton press makes all-aluminum splice after conducters are pulled in. Entire pull, approximately 8,000 ft, is then sagged to 27% of its ultimate strength

servatively that the total losses per circuit will be reduced by 5,700 kw for a loading of 120,000 kw. The double-circuit line is being reconductored also to take advantage of current metal prices.

The new pulling rigs, built by Petersen Engineering Co., Santa Clara, Calif., have a rated pulling tension of 6,000 lb at up to 4 mph. Each rig has two bull wheels which operate through the power take-off on the truck. Bull wheels have four neoprene-lined grooves which grip the pulling line and hold it under tension without damaging it. Located behind the bull wheels on the same frame is a power-driven mount which will take reels measuring up to 44 x 72 in. The pulling line is taken up on this reel at reduced tension as it comes off the bull wheels.

To control pulling speed and conductor tension, the operator has four controls on the pulling rig. One control permits adjustment of the take-up tension of the reel. An accelerator handle linked to the truck engine controls the speed of pulling in. Speed also may be adjusted by changing the gear ratio between the bull wheels and the engine. To start and stop the bull wheels and the take-up reel, one handle operates a clutch to the power take-off. Another handle brakes the bull wheels when they are unclutched.

Control over the conductor during stringing is completed by use of braking rigs at the pay-out end of the pull. These trailer-mounted tensioners have neoprene-lined four-groove bull wheels which hold the conductor under tension. Each rig has two independent sets



Copper is pulled in and reeled with two rigs, each capable of a 6,000-lb pull at speeds to 4 mph. Over three tons of copper are pulled in per reel. Each rig filled two reels while pulling in two phases at same time, then each pulled about half of the third phase

of bull wheels to handle two conductors at one time. Tension rigs also were built by Petersen Engineering Co. In the PG and E operation, two reel trailers feed one rig and a third trailer supplies the second rig.

The all-aluminum conductor is strung using the rope-lay copper as the pull-in line. Initially, about 8,800 ft (one reel per phase) of aluminum is being pulled from each setup. This covers about 10 spans averaging 800 ft. As the stringing crew becomes more familiar with the operation, the length of pull can be extended to two reels per phase (three miles) from each setup.

Normally, the top and middle-phase wires are pulled in simultaneously, with one phase on each pulling rig. About halfway through the pull, the loaded reels of copper are lifted from the rigs and empty reels mounted in their place. The weight of the rope-lay copper is the limiting factor in this case. For the third-phase wire, each rig pulls in about half of the total pull, or enough to load each reel.

To speed the stringing operation, use is made of preformed steel guy grips to splice the aluminum to the copper. It also is necessary to cut out the original threaded splices used on the copper to prevent damaging the travelers. Preformed steel splices are used to rejoin the copper for the pulling operation.

Along with the reconductoring of the line, it is necessary to change out the original tower arms. The new, all-aluminum cable, being lighter and larger, requires a greater clearance from the towers under design wind and loading conditions. The arm change-out is being done in two phases. The first phase is handled by the "unclipping" crew, which cuts the main members on the arms as they remove the insulator strings and put the rope-lay copper in travelers. The second phase is handled in two operations. One crew assembles the new half-arms (for both circuits) and leaves them at the base of the tower. The clipping-in crew removes the old halved arms from one circuit and raises the new half-arms with insulators attached. The all-aluminum cable is armor-rodded and dampers are installed as the line is clipped in.

For maximum efficiency, the 142 miles of line have been broken down into six sections each 20 to 25 miles long. Circuits Nos. 1 and 2 are reconductored alternately in each section. This plan limits the length of line being worked on, minimizes movement of heavy equipment between sections, and makes maximum use of each of six supply depots for a minimum of time. In any one section of line, only one circuit is reconductored at a time and the other circuit is energized. As the second circuit is being clipped in, the clipping crew will bolt splice plates between the inner ends of the main members of the new half-arms.

New 11- to 12-ft half-arms are required to give proper clearance for lighter and larger aluminum conductor. Half-arms are assembled for both circuits at the tower bases

Economics of residential

265/460-v Underground

Howard S. Smith
Colorado Central Power Co.
Englewod, Colo.

Higher secondary voltages for residential distribution are highly controversial, but in all probability will be used as the load per customer increases. At the present time the 265/460-v system offers cost advantages over the conventional underground systems especially where a 13.2-kv primary system is utilized. The following article compares a 265/460-v modified underground system with a 7,620/13,200-v overhead system.

The layout shown in the accompanying drawing is for an average customer demand of 8.7 kva per customer if the area has 75-ft lot frontage. To connect the services to the underground system, service pedestals are proposed and should be located in general so four services can be served from each. Space should also be allowed for a sectionalizing switch or a capacitor in the service pedestal. (See accompanying drawing for typical service pedestal design.) Because of lot line offsets usually found in all recent subdivisions, conduits should be run into properties so that the customer does not have to disturb his neighbors' property to run his service. The customer's service will include a 10-kva dry-type transformer that will step the 460-v service to 120/240 v except for large motor load, which will be served three-phase at 460 v.

A comparison between the 265/460-v underground system and an overhead system is shown in Table I for various lot frontages for a 12-block area.

To make an actual comparison of the economics of the overhead and 265/460-v underground systems, annual charges are tabulated on a per customer basis in Table II. Also considered in this analysis is the net revenue (1.3c per kwh) from the core loss of a 10-kva dry-type transformer. Copper losses of the dry-type transformer were not considered because copper losses cost approximately the same amount as the bottom step of the residential rate.

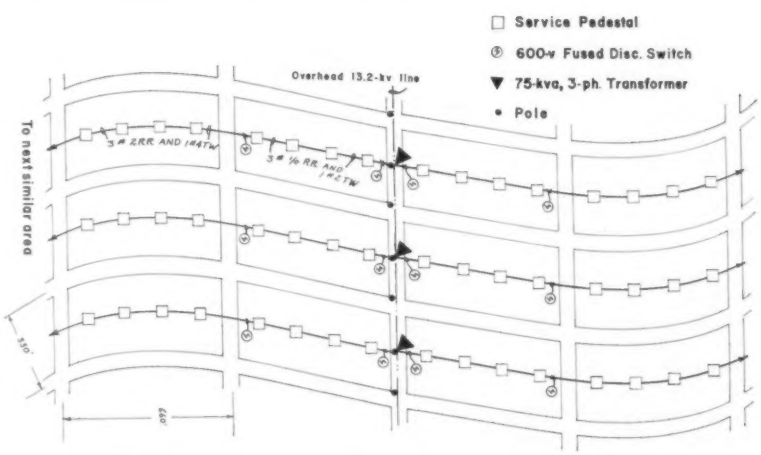
It is interesting to note that the overhead system and the underground system compare very favorably on a yearly cost to serve basis for both the 75-ft and 100-ft lot frontages with only $4.30 per year difference in favor of the overhead system with 150 lot frontage.

It is estimated that the customers service including the dry-type transformer will cost about $400 if $240 is

Here Are Some of the Advantages

The 265/460-v system of modified underground should be considered where large areas with high load density are to be served underground for these reasons:

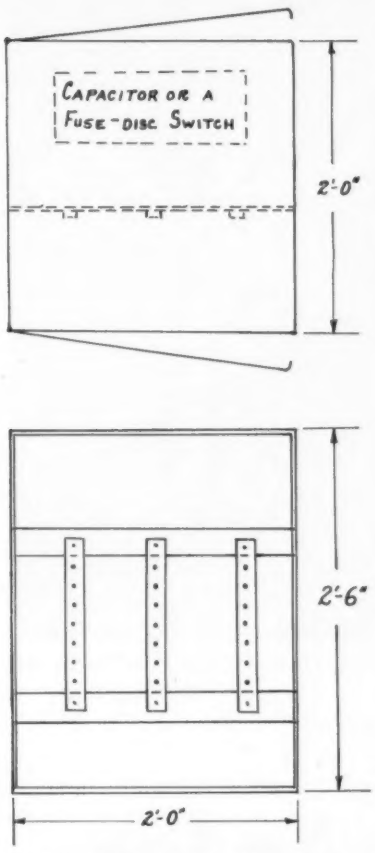
1. **Annual fixed costs are less than or equal to costs for conventional overhead** on a per customer basis for 75-ft and 100-ft lots, respectively.
2. **Tree trimming problems are reduced to a minimum.**
3. **The transformers are at a location which is easily accessible from the street.** The utility repairman does not have to wheel heavy transformers across garden and lawn areas when replacement becomes necessary.
4. **Three-phase power is available to all who desire it.**
5. **100-amp equipment will be adequate** for many years to come in the average residence. Current transformers should not be required for any residence today and should be sufficient for some time to come.



Modified 265/460-v underground system provides for average demand of 8.7 kva per customer on 75-ft lot frontages. Service will include a 10-kva dry-type transformer to serve 120/240-v load. Large motor load would be fed directly at 460 v, three phase

Cost Estimate for 265/460-v Underground Distribution

11,700 ft 1/0 type RR cable @ $570/1,000 ft	$ 6,669
13,700 ft No. 2 type RR cable @ $365/1,000 ft	4,900
3,900 ft No. 2 type TW @ $280/1,000 ft	1,092
4,560 ft No. 4 type TW @ $160/1,000 ft	730
7,820 ft trench and backfill @ $0.20/ft	1,564
6 sectionalizing-service pedestals @ $250	1,500
42 service pedestals @ $160	6,720
6 outdoor fused disconnect switches	700
700 ft 3-in. conduit @ $1/ft	700
3 75-kva 3-phase transformers installed	5,400
Miscellaneous material and labor	1,000
Total	$30,347



Service pedestal should include space for a sectionalizing switch or capacitor. Up to four services can be fed from each pedestal

Table I: Cost Comparison of 265/460-v Underground And a Conventional Overhead System

Lot Frontage	Design Kva Demand per Customer	Cost of Overhead System for a 12-block Area Including Services	Cost of 265/460-v Underground System for a 12-block Area Including Services
75 ft	8.7	$20,948	$30,347
100 ft	11.0	18,488	28,427
150 ft	13.7	17,428	26,507

Table II: Comparative Analysis of Fixed Charges Per Customer of a 265/460-v Underground System Without Services And an Overhead System With Services

	Lot Frontage	265/460-v Underground	13.2-Kv Overhead System
Fixed annual charge*		$21.10	$17.00
Core loss revenue from a 10-kva dry-type transformer		(7.08)	
Annual metering costs		4.85	4.17
Total	75 ft	18.87	21.17
Fixed annual charge*		$26.40	$20.00
Core loss revenue from a 10-kva dry-type transformer		(7.08)	
Annual metering costs		4.85	4.17
Total	100 ft	24.17	24.17
Fixed annual charge*		$36.80	$26.10
Core loss revenue from a 10-kva dry-type transformer		(7.08)	
Annual metering costs		4.85	4.17
Total	150 ft	34.57	30.27

*13.4% for underground; 15.6% for overhead.

allowed for installation of the dry-type transformer.

With costs established, let us look further into the 265/460-v underground system. The opponents of this system claim these disadvantages:

1. Dry-type transformers have noise levels that may be objectionable.
2. The National Electrical Code will not allow any outlet voltage of over 150 v above ground.
3. 120-v and 240-v appliances are standard.
4. The 277/480-v transformers will require another transformer type for stocking purposes.
5. Three-phase motors with 3 to 4% voltage unbalance will impose problems of motor burn out.

To answer these claims, the following counterarguments are presented:

1. Future developments should enable manufacturers to eliminate the objectionable noise level in dry-type transformers. Certain manufacturers indicate that this problem cannot be solved without increasing transformer prices, but it is felt that research and new materials will solve this problem satisfactorily. If not, an increase in the mass production of a new design item will make the price reasonable. Moreover, the noise problem might be minimized or solved by placing the transformer in the garage.
2. European systems have operated at 220-v above ground for some time with no serious problems. Future developments in the design of outlets for ranges, dryers, etc., may eliminate the 150-v above ground code rule as applied to fixed appliances.
3. Commercial establishments and apartment houses will be served with increasing frequency at 265/460-v. Therefore, there is a good possibility of 265-v or 460-v appliances and electrical house heating units soon being manufactured.
4. The 277/480-v transformer is a much better standard transformer than the 480-v transformer because of the ability to provide definite voltage above ground, thus eliminating the dangers associated with winding-to-winding failures in transformers. It is also possible that the 120/240-v transformer of today may have a 138.5/277-v rating sometime in the future.
5. The voltage unbalance realized on a 265/460-v system should not be objectionable to motor operation since the system in question has a maximum design drop of 4.4%. With 100% load on phase A, 133% load on phase B and 67% load on phase C, the voltage inbalance is 1.8% which should not adversely affect motor operation.

Conclusions

The 265/460-v system for residential distribution is in its infancy but it does offer cost advantages over the conventional underground system to the customer even with the installation of a full capacity dry-type transformer.

Many changes will have to take place before the 265/460-v system can realize its full economic advantage. One of these changes involves the manufacture of 265-v or 460-v ranges, dryers and other fixed appliances. The feasibility of serving large apartment houses with 265/460-v may stimulate this situation and create a demand for higher voltages in the major appliance field. The change from a standard 120/240-v utilization voltage to 265/460 v will be a slow process, but should be looked at on a long-term rather than a short-term basis.

Tree-trimming tool is shown in operation here and in picture below. This air pruner weighs less than 5 lb; does the complete job

Tree trimming costs cut by

Light-Weight Circular Air Saw

A single tool that does the complete job has reduced tree trimming costs greatly for Portland General Electric Co., reports P. E. Lansdem, superintendent of the Oregon City Division of that company. This is the air motor operated circular saw shown here.

The tool, known as the Ackley air pruner, uses the same small powerful air motor used on Ackley woodworking tools. The tree saw was made for Weed Control Service Inc. of Portland.

The tree trimming tool, weighing less than 5 lb, consists of an 8-in. circular saw mounted on a 74-in. hollow insulating handle. The saw is driven 5,000 rpm by compressed air passing through the handle.

In addition to its amazing cutting speed, clean cuts, universal application to limbs up to 6 in. in diameter and light weight, one of the principal advantages is low air consumption, according to Lansdem. A 35-cu-ft compressor will develop maximum power of the air motor. Lansdem makes a saving of a third or more in tree trimming costs as compared with equipment previously used.

ELECTRICAL WEST SALES GUIDE © AUGUST 1956

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

Good market

Attendance at San Francisco's Summer Market (see p 94) was up 6% as compared with last year. Buying was spotty but exhibitors felt that the interest was there and orders would come later.

All-electric parade

Celebrating National Home Week, Sept. 15-23, the Island of Oahu will have a Parade of Homes—all electric homes. Five will be shown, with latest in electrical living. Kitchens will be featured, with G-E, Hotpoint, Frigidaire, Westinghouse and Crosley each installing one. The event is sponsored by The Home Builders Assn. of Hawaii and The Honolulu Advertiser; represents an investment of more than $150,000.

Will have everything

Boise's Parade will display 10 homes. An all-electric home will feature full housepower; have every electric appliance on the market, including heat and air conditioning. Admission will be free, the committee has decided.

TV week

Slogan for TV Week, Sept. 23-29 is "National TV Week—Celebrating the Finest Home Entertainment in Sight." The event is sponsored by RETMA, NARTB, NARDA and the TV Advertising Bureau.

Freezer contest

A certificate worth $400 on the purchase of a home freezer will be awarded as grand prize in a consumer contest sponsored by Honolulu electric appliance dealers. The nine-week contest also will offer four prizes each week. Contestants go to dealers for the entry blanks, which carry coupons for the weekly drawings. If the grand prize winner has a freezer, the purchase certificate may be used toward any electrical appliance offered by eight manufacturers represented.

Clinic time again

Profit Clinics, sponsored so successfully in past, will be repeated this year. NARDA will hold a clinic at Bakersfield on Sept. 23 for northern California dealers. At Seattle NATA will sponsor its fourth annual clinic at the Benjamin Franklin Hotel on Sept. 27. Speakers on the national troupe will include NARDA President Don Gabbert, Chet Gifford, Al Robertson and Al Bernsohn.

Valley firm is sold

Valley Electrical Supply Co. of Fresno will sell practically all of its assets to G-E, effective Aug. 31, Ken Hampton, vice-president and manager of the Valley firm, has announced. The company wholesales G-E major appliances and air heating and cooling equipment. It was organized in 1911 as a merchandising concern by the late Kelly Courtright; became a subsidiary of San Joaquin Light & Power and of PG and E when the utilities were consolidated. Two retail stores, at Fresno and Bakersfield, were models that set a high standard for dealer merchandising and the firm instituted a plan by which sales of major appliances were made by its salesmen through local dealers. It gave up its appliance stores before the war and moved out of the Power building to its own quarters in the industrial district. Valley Electrical's 18 employees will be able to join the PG and E organization without loss of senority. Hampton said.

Rush to electric

Appliance sales in Stevens County soared following purchase of PUD facilities by Washington Water Power. In the first five months of 1956 electric appliance dealers reported sales up 62.4% as compared with the same period last year. Freezers led with 90% increase; clothes dryers were up 40.8%; water heaters 29.4%; ranges 28.8%; refrigerators 24.8%. For further details, see p 36.

Extended

With 220 completed wiring jobs by July 5 and repeated requests for an extension of its "Wire on Time" financing plan beyond the three-month period, Pacific Power & Light Co. is continuing this promotion beyond the July 31 deadline.

TV push in Tucson

TAMA is inviting all Tucson dealers, whether members or not, to take part in an association-sponsored TV sales promotion. For the two-month campaign—Aug. 15-Oct. 15—TAMA will furnish a promotion kit of window posters, bumper strips, price tags and suggestions for tie-in with its advertising. TAMA newspaper ads will stress second sets and portables. A contest for salesmen will offer $100 and $50 prizes in two classifications—stores with four or more salesmen and smaller stores.

Seasons don't matter

Who says dryers are seasonal? asks PG and E in its July dealer bulletins. In 1955, 50.2% of laundry dryers sold in company territory were sold in months considered "off-season," it explains. Between February and September last year $4,548,755 worth were sold. Based on past experience the utility estimates that 3,345 units with a retail value of at least $906,500 will be sold during August 1956 in its service area.

Picks up

While first-half retail sales figures in some localities showed a decrease as compared with 1955, business picked up for the month of June, with dealer reports showing increases over the same month last year.

Striking it rich

In Idaho Power territory, where the "Strike It Rich in '56" campaign is in full swing, six-month figures showed increases in all four major categories—dryers, ranges, water heaters and freezers. Electric dryers held the spotlight with 113% of quota sold in the campaign to date, but the other three appliances were well past the half-way point.

Operation Comeback

Following the recent crippling strike, Westinghouse could have decided to save money; instead it was ready with the $5,000,000 "Watch Westinghouse" campaign and published its first ad within 10 or 12 days after the strike settlement. Richard J. Sargent, general manager of marketing and distribution for the consumer products divisions, pointed this out in a talk before the San Francisco Advertising Club on Aug. 1. He was in the West as a part of the team introducing the second merchandising program since the strike—a three-month Operation Landslide in connection with the political conventions. Half of a $10,000,000 budget will go into underwriting CBS TV and radio coverage of the conventions, election night and a program called "Pick the Winner." The other half will go into newspaper and magazine advertising and local tie-in. The executive team is visiting dealers and distributors throughout the West; reports good response.

1957 line shown

Packard Bell showed its 1957 TV and radio line in dealer shows held throughout the West. At Los Angeles, 3,000 attended the showing at the Beverly Hilton Hotel and northern California dealers had a two-day showing at the Sheraton Palace. Featured with a complete line of portable and console sets was the golden two-millionth set. Robert Bell, executive vice-president, said that sales were 29% ahead of last year. A 21-in. color set selling for under $500 is expected by September 1. The firm is celebrating its 30th anniversary this year.

Study hazard

Extensive tests this summer with children of National Bureau of Standards staff are to help do away with hazards of entrapment in household refrigerators and freezers. They are being conducted by the bureau with NEMA and the Department of Commerce.

LBE progress

Live Better—Electrically is geared for a strong promotion of all-electric kitchens in October. Ads will appear in Life, Saturday Evening Post, Good Housekeeping and House Beautiful. House Beautiful will have the LBE Idea Book attached to the front cover of 420,000 newsstand copies.

Sells patents

Amana Refrigeration Inc. has taken over tools, dies and patents of Deepfreeze Appliance Division of Motor Products Corp. Admiral has sold to Hallicrafters tools and dies of its recently acquired Belmont division for manufacturing private brand TV and radio receivers.

Comes West

William R. Cooney has been made Westinghouse Pacific Coast regional manager of portable appliances replacing Paul W. Bradner, who is now northern California district manager of vacuum cleaner and fan sales. He comes West from service in Mansfield, Springfield and Pittsburgh.

Appointed

Westinghouse Supply has made new appointments in the West. **Frank C. Porter** has been made branch manager of the consumer products division, with headquarters in San Francisco. **Jack O'Donnell** is now San Francisco sales manager. O'Donnell formerly was in Portland. Porter has been with Wesix, Columbia Electric & Mfg. Co. at Spokane and F. B. Connelly in Seattle and Portland.

Retires

Mason M. Roberts, head of Frigidaire and General Motors vice-president, has announced his retirement. He is to be succeeded by **Herman F. Lehman,** general sales manager of Frigidaire. Roberts has visited the Western area frequently during his service with the company.

Heads league

Arthur M. Banchero, Sacramento area representative for the Wesix Electric Heater Co., is new president of the Sacramento Valley Electric League. Other new officers are: James Bauman, vice-president, and Art Maryon, Robert Moore, Rex Moore, Chris Nelson and Kai Rasmussen, members of the board of directors.

Elected

Mrs. Edith Rauch, Puget Sound Power & Light Co. home service director, was elected to the Electrical Woman's Round Table board of directors for three years. She is the only board member from a firm West of the Mississippi.

Promoted

Carrol W. Brissendon has been promoted to general sales manager of Portland General Electric Co. He will report to **Howard Arnott,** who received a promotion to vice-president at the same time. Brissendon was formerly Portland division sales manager.

Changes

Tacoma City Light, in a reorganization recommended by a management consulting firm, has appointed **Ivan Usher** to head a community relations division. Sales, customer information and public information departments are under his administration. **E. Z. Fredericks** is new commercial sales supervisor.

More about people

News about people—Maxine Gentis, formerly with PG and E, now heads up the home economics division of Sacramento Municipal District . . . Advertising and sales promotion supervisor for Honolulu Electrical Products Co. is now **Richard Boyle,** formerly with Westinghouse in San Francisco . . . First "Housepower" contest winner in the Phoenix area was **Mrs. J. L. Reed,** a customer of the Salt River Power District. She received an Ironrite . . . **Tom Garvin,** Los Angeles regional manager for Magnavox, earned the double honor of membership in his company's "Million Dollar Club" and designation as the top Magnavox salesman of 1955 . . . **Fred Stevens,** Los Angeles Packard-Bell distributor, received a certificate for selling $5,000,000 worth of equipment . . . **Tom Combs** has joined the Fred L. Lestoe Co., Los Angeles representative for Dominion Electric Corp. electric table appliances . . . **George J. Kukunaga,** executive vice-president of Easy Appliance Co., Hawaii, received Philco's silver trophy for being the leading U. S. distributor of the company's air conditioners . . . **Clyde Allen** has given up his own company and has joined Philco as sales representative for home laundry equipment. His territory includes five states and Hawaii.

Changes

Distributor changes in the West recently included selection of Jack Berryman to represent Packard-Bell in the San Francisco Peninsula area. He will headquarter at 1157 Post St., San Francisco . . . Amana Refrigeration Inc. has named the Parker Co., 4655 Colorado Blvd., Denver, and Worthen's 504 N. 15th St., Las Vegas, Nev., as distributors.

New distribution

RCA Whirlpool home laundry appliances will be handled through two new distributors in the West. Flint Distributing Co., Salt Lake City, and Heald Supply Co., Billings, have been selected.

New gadget

What it is? It's remote control tuning of television sets, but it has no wires, batteries, electricity, light or radio waves. There is no sound to its operation, nor is there a "feel." It is called Space Command, and it is on some models of Zenith TV sets.

Electronic cooking

Hotpoint now offers an electronic cooking center that can be used as a built-in appliance, a free-standing appliance or as a roll-around appliance. The new cooking center is described as resembling a double-oven built-in, finished in satin chrome and accented by two coppor colored grid screens.

"Hotpoint Studies Women" is more than just an interesting title—it is a brochure designed to help electric utilities with tie-in ideas for three national sales programs currently going on. Hotpoint says the brochure offers "a special utility sales program that translates broad national aims of 'Live Better—Electrically,' 'Housepower!' and 'Operation Home Improvement'." Reported in the brochure is a Hotpoint market research to determine changes in the living habits of an average American family.

Tie-in ideas

"Light for Living" is the name of a new lighting promotion sales package put out by General Electric's Large Lamp Department for use by electric utility companies. It includes three kits with advertising and promotional material to interest builders, fixture manufacturers, distributors, and the portable lamp field. Each kit contains a book entitled "How to Decorate and Light Your Home." The package is available from Lamp Division district offices.

Home lighting

Cold feet are getting the attention they deserve now. Philco Corp. has designed an automatic electric blanket that is seven degrees warmer at the foot.

Cold feet?

Portable appliances shown by Westinghouse at San Francisco's Western Merchandise Mart included a new coffee maker that brews 10 cups in 10 minutes with the help of a new pump assembly. Electric bedcovering offered now includes twin-size blankets. Also new is an upright vacuum cleaner with self-adjusting nozzle and handle. All three make their appearance this month.

Portable

Conscious of a mobile America, Silex has developed a 42-oz electric water kettle that is equally at home in house or auto. The travel kit consists of carrying case, two cups and saucers, spoons, window bracket and cord. The unit is attractive, too, so it will not be out of place in the kitchen. In the auto it operates from the cigarette lighter.

Electric kettle

Efforts to stir up more interest in dishwashers have led to production of a bigger machine by Youngstown Kitchens. The company feels Mrs. Homemaker wants more capacity so all the day's dishes can be washed at once. Result is the DW 300, a 30-in., front-opening model.

Getting bigger

Broiling and baking at the same time is possible with Frigidaire's new two-in-one wall oven. It has a removable divider that permits broiling in the top portion simultaneously with baking at a different temperature in the lower section. With divider out, the unit is a full-sized oven.

Double duty

Portable television is cutting a wider swath as six more companies announce production of the popular small sets. Motorola has announced a 14-in. (diagonal) portable; Hallicrafters has 10- and 14-in.; Trav-Ler Radio Corp. has a 17-in. portable; Magnavox a 17-in.; Admiral 14- and 17-in.; and Emerson announces a portable television-phonoradio that can operate from an auto cigarette lighter with use of an inverter. Prices on the portables range from $99 to about $150.

Portable TV

Three modular kitchens by Hotpoint recently introduced are available as 7-ft without oven, 7-ft with oven and deluxe 9-ft unit. Features include storage drawer, automatic electric dishwasher, stainless steel top with four surface cooking units, and others, depending on the model. Flexibility of installation, durability and appearance are three points the company has emphasized. Available in right or left hand models and five colors.

Modular kitchens

An appliance finish that is reported to be the most durable coating ever made from organic materials is in the testing stages at E. I. Du Pont De Nemours & Co. It is described as "very much harder than currently used enamels."

Harder finish

Among new small housewares recently announced is an electric Oven Toaster by the Silex Co. It has temperature control, attractive finish, and can be used at the table. Sandwiches, etc., are placed on a drawer-like grill.

Toaster

A new phase has been added to the washing cycle of Kelvinator laundry equipment in the 1957 models. Called "Magic Minute," the machine agitates clothing in a highly-concentrated solution of water and detergent or soap for one minute. After this treatment, the water flow to fill the machine continues and the remainder of the cycle is completed. The 1957 line of home laundry products consists of five automatic washers and five matching electric dryers, six wringer washers and an ironer.

Laundry line

Utility promotion adds farm load in equipment for

Handling Milk in Bulk Tanks

Refrigerated tanks like this one are being installed on farms in Puget's service area

Bulk milk handling, once thought practical only for large operations, is a growing practice in the Northwest, where herds average 20 to 40 cows. Washington dairymen, for example, have put approximately $1,000,000 in farm tanks, and as more of them discard the old cans for every-other-day pickup in refrigerated trucks, the investment may reach $7,000,000.

With this development has come a new rural load building opportunity for the utilities. Puget Sound Power & Light Co., for instance, built into its farm program last year an intensive promotion of refrigerated milk tanks.

When the year ended 304 tanks, ranging from 100 to 1,000 gal, had been added to the utility's lines and 88% of all Grade A milk in the area was being bulk handled, Karl Dimmitt, Puget's rural electrification director, reported. In most cases, 50-gal automatic water heaters (larger when the farmer did not already have supplementary water heating in his milk house) were added as well. In addition, the farm representative had the opportunity to help the farmer improve his wiring layout, Dimmitt pointed out.

Puget serves about 30,000 farms and approximately 99% of all homes and operations are electrified. Its cooperative agricultural sales promotion, resumed in 1954 after a lull during the postwar construction program, is designed to help farmers use electricity efficiently, to bring electricity to ever widening farm uses and to increase revenue per mile of rural line. In such a program promotion of refrigerated milk tanks was a natural.

Initial investment in the tank is high (about $3,500 for a 600-gal tank and $2,000 for a 200-gal tank) and there are other possible costs in milk house remodeling, extra wiring, road and driveway improvements. But provided there is enough volume to justify the equipment, there are advantages in improved milk quality and reduced labor and plant costs.

Cameron Adams, assistant supervisor of dairy and livestock, Washington State Department of Agriculture, has estimated that return on investment in a bulk tank is about $100 a year for every 100 lb of milk shipped per day, including 20% reduction in hauling costs, elimination of can and dump loss, bonus payments for tank milk, at present about 10c per 100 lb.

The Puget promotion was supported by dealers. Utility farm representatives made direct calls, worked at fairs and through such contacts as 4-H clubs, county agents, farm implement salesmen, the Farm Bureau, Grange, Soil Conservation Service, State Water Resources Board, State Wiring Inspectors, colleges and experimental stations.

An effective tool used by the company in promoting the tanks is a visualizer or county map. On this map each farm representative pinpoints all bulk milk tank installations in his county, with symbols to indicate size of tank. He is thus able to gage the per cent of farms with this equipment and the utility has a guide for planning line extensions and requirements as loads are added. In addition to its informational value, the map tells a sales story to prospects. A look at it is a quick way for the farmer to size up what his neighbors are doing and what his competition is in the county.

The Puget program was a cooperative one, with benefits for all who took part. One most to benefit was the farmer, Dimmitt pointed out.

To Irrigate or Not to Irrigate?

Because they want their farm customers to use sprinkler irrigation when it is needed—and only then—Northwest power companies are inaugurating a new service. It is a soil moisture check in selected areas with an instrument called the Irri-gage. Readings are taken three times a week by utility farm consultants in cooperation with members of the Extension and Soil Conservation Services and are reported to farmers through newspapers and by radio.

The Irri-gage unit includes a plastic stake with absorbent resistance elements at various ground depths. When the reading is taken, the bands let more or less current through depending on wetness or dryness.

Although the power companies are setting up this equipment on selected farms only, an attempt is made to include as many different soil types as possible. Any farmer in the area can then use the reports as a guide for his own operations by comparing his soil and its ability to hold water with that of the nearby test farms.

Portland General Electric Co. is believed to have been the first utility in the area to experiment with the Irrigage. Puget Sound Power & Light Co. tested it on one farm last year and both Puget and Washington Water Power Co. initiated full-scale test programs this season.

Clyde Allen shows features of the new Philco laundry equipment to an attentive group. Interest shown here was typical of Market goers

Attendance picks up at

San Francisco Market

Hotpoint's new TV line shared interest with its other products on display. Here Clara Sherburne, home economist, talks with Mr. and Mrs. Kenneth MacDonald of San Francisco

Prepared by reports from Eastern marts for a quiet Summer Market in San Francisco, exhibitors were agreeably surprised by a 6% increase in attendance as compared with last year. Interest was high in whatever was new and ordering, though spotty, was in good volume in many spaces.

New appliance models for the most part had been shown previously or were not to come for a month or so. However, traffic was brisk on appliance floors and those who manned the display booths were kept busy answering questions about the products. Retailers came mostly from the smaller towns, it was reported.

Electric ranges showed the biggest pickup, with demand at both ends of the price range. Stack-on types were especially popular.

Laundry equipment, however, was the leader, with greatest interest in de luxe units. Combination washer-dryers did a fair business.

Color television rated high interest and high fidelity equipment continued its upswing, with orders written on component parts. In radio, lightweight portables and colored cases were most popular.

Among the new lines:

Hotpoint's new TV line was on display, with models ranging from 14-in. portables to 24-in. consoles and a variety of cabinet styles. Automatic power tuning for channel selection was featured. This manufacturer's electronic range, shown elsewhere in the West, was not available for Market Week.

Westinghouse was showing a new color TV receiver, featuring its 22-in.

rectangular all-glass tube, and new 21- and 24-in. black and white models.

Crosley-Bendix also had its new TV models on display for the first time.

Kelvinator got a big play on its electronic range, which drew spectators at every demonstration. This unit has a browning element, with separate automatic control.

Interest in the Philco booth centered on the manufacturer's new laundry line, introduced last spring.

Again this year a reception and cocktail party was substituted for the Radio, Television and Appliance dinner.

Speaking at the press luncheon opening day, Fred H. Dilg, vice-president of Sterling Furniture Co., San Francisco, gave a comprehensive picture of the home furnishing trends. Washer-dryers are the bright spot in the appliance business, he said, and in them lies the new market.

Pearl Fish, Kelvinator home economist, heats coffee in the cup on the new electronic range for Todd Malone of Todd's, San Leandro, Calif. Mrs. Malone and Todd Jr. look on

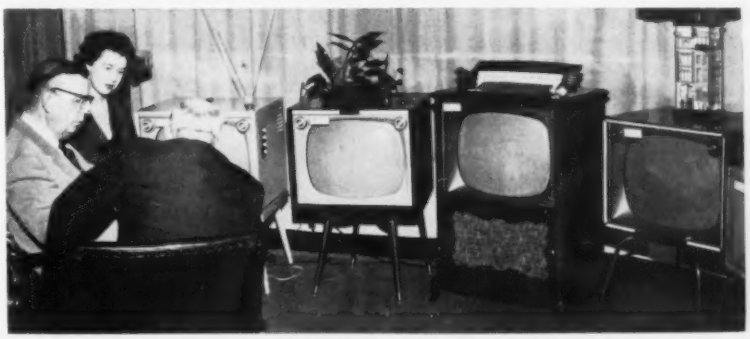
Opportunity School

Fifteen makes of automatic washers are now on the platform of the Opportunity school in Denver for the use of the classes training servicemen for dealers and distributors. In process of writing is the curriculum for a dryer service training course, which will be started in the late fall or the end of the year. Manufacturers are furnishing information and have promised product demonstration assistance when that course is started.

The Opportunity school classes have won national recognition in the home laundry industry. They were initiated by Ray Jones and have been under the direction of Ted Leisinring and Leonard Smith of the Opportunity school. A review session has been run recently for classes that have been in training since September. The distributor and factory servicemen monitored the courses to see that they covered the subjects satisfactorily.

Procedure is to run about three or four makes at a time for better individual instruction to groups of three or four men. These men do not touch the product until they learn the theory and the electrical circuiting on each make. After this, they tear down the demonstrator model and are shown what to do to shoot trouble.

There has been a total enrollment of 31 in the evening classes since September. The school limits the size of the classes to 15. In addition, a clinic is held once a month on a specific make and it is called distributors' night. The distributor has charge of the program and it must be on service. Its purpose is to keep the servicemen up to date on any changes in the design of new models.



At Crosley-Bendix, Frances Alexander, home economist, and E. C. Brode, zone manager (back to camera) talk with John H. Patrick, State Fair consumer survey council

Features of Westinghouse Space-Mates are discussed by Vic Musy, Westinghouse Appliance Division, with Jack O'Donnell and Frank C. Porter of Westinghouse Supply Co.

Montana Power is helping customer

Live Better Electrically

Live Better . . . Electrically is the slogan for Montana Power Co.'s 1956 appliance sales promotion, beamed at urban customers in its Billings and Great Falls divisions. And again this year the utility is willing, under certain conditions, to pick up part of the tab.

Based on its earlier *Live Better . . . Live Electrically* program for rural areas, the current promotion offers cash allowances for the same five electric appliances—ranges, water heaters, freezers, dryers, water systems—and an additional one, refrigeration-type air conditioners.

Aim is to get additional load and therefore allowances apply only on appliances not already in use. With this qualification, ranges and water heaters each carry a $25 allowance and the other campaign units $10 each. Air conditioners must be ½ hp or over to get the allowance. Eligible customers may have the allowance on any one or all of the six units.

During the campaign period, Jan. 1 to Dec. 31, the company is conducting an old range and water heater roundup, paying direct to customers $25 toward the purchase of a new electric unit to replace one that has no resale value. To qualify, the customer must buy a new electric unit and the old one must be junked.

In addition the utility will finance residential wiring on its recently inaugurated time-pay plan.

At the half-way mark on June 30, D. J. McGonigle, general sales manager for Montana Power, announced these results: A total of 1,479 units had been sold in the two divisions under the plan. Included were 704 ranges, 513 dryers, 206 freezers, 26 water heaters, 21 water systems, 9 air conditioners. Coupon redemption cost the company $25,740 but added annual revenue value of the equipment was $36,216.

On the wiring promotion, which applies in all Montana Power divisions, 354 residential wiring plans had been submitted by June 30 and 230 installations had been made. In the commercial and industrial classification, 177 plans had been submitted and 120 installations made.

How campaign works

Details of the appliance campaign were carefully worked out. As in other Montana Power promotions, personal contact was given high importance and a company representative called on every eligible customer before June 30.

Preceding this home visit, each customer received from the division manager a letter telling of the cash offers and time wiring plan and saying that a company employee would call soon to explain both opportunities. During the call the utility representative explained the program, sold advantages of the equipment and left a coupon for each of the campaign appliances that the customer did not have in use at the time.

To customers living in communities covered by the 1955 campaign went a letter explaining that coupons in their possession would be honored until Dec. 31, 1956, and offering to replace lost coupons.

Coupons are turned over to dealers when the appliances are purchased and are redeemed by Montana Power. They are numbered serially and are in quadruplicate, with copies for the general office, the customer, the division and the town, where they are available to dealers.

Distributors and dealers were asked to support the drive with product advertising and customer follow up. It was urged that advertising include the slogan *Live Better . . . Electrically* and that the bulk of it be in April and May. Before starting coupon distribution, each division held dealer meetings or made personal calls to explain campaign details and ask for cooperation.

Wiring plan

Under the wiring plan, specifications may be drawn up either by the company or by an electrical contractor. To qualify for the time payment, however, each job must meet standards in the *Residential Wiring Handbook* published by the Industry Committee on Interior Wiring Design. Specifications are made in triplicate with copies for the customer, wiring contractor and company.

The customer may designate the contractor or, if he has no preference, the company submits the wiring layout to the contractor next in line in a sequence worked out at the start of the program.

When the work has been completed satisfactorily the company pays the contractor. A contract has been signed previously with the customer, who is billed monthly with his service statement.

The company will lend up to $500 and will carry it as long as 36 months. Contracts cover wiring specified plus a price differential charge for time payments.

WWP takeover brings on

Appliance Buying Spree

Sale of Stevens County, Wash., PUD to Washington Water Power Co. last November was followed by an electrical appliance buying spree. In the first five months of 1956, with WWP service and rates in effect, appliance sales in the county rose an average of 62.4% over the same period of 1955.

The breakdown was equally impressive. Freezer sales ran 90% higher, electric clothes dryers 40.8%, water heaters 29.4%, ranges 28.8%, refrigerators 24.8%, TV 23.6%, automatic washers 15.4%. Only two appliances slipped, conventional washers down 11% and radios down 3.1%.

There are a number of isolated rural homes in the area that had no electric service and the utility is keeping its campaign promise to extend lines to these homes.

Kinsey M. Robinson, WWP president, estimated that 1,819 residential and rural customers were billed $7,582 less in the first normal month under his company than they would have paid under PUD rates in effect at the time the system was acquired. In June alone the Colville office of WWP wrote more than 500 service orders compared to a normal of 150 to 200.

There is every indication that the shopping rush has ebbed back to pre-election normal. But the experience of Robert L. Strauss, who with his father, Louis Strauss, operates dry goods and hardware stores in the county seat, is typical. "For five months our electrical appliances were our leading department," Strauss said. "Appliance sales were larger than our other six departments."

A Look at Our Maximum Demands

Chester H. Hefner, Assistant Building Inspector, Electrical San Mateo County, Calif.

Let us discuss maximum demands of various loads to ascertain if we are getting the fullest possible benefit from existing service entrance conductors in our drives for increased Housepower and Live Better . . . *Electrically.*

As I brought out in September 1955 in my article, "The Inspector, the Code and Adequate Wiring," presented at the Southwestern Section IAEI annual meeting at Riverside, I feel that in many instances the interpretations of various load demands result in wire size increase needlessly. It should be a very obvious fact that the important factor is not the total connected load but the maximum demand of that load.

One of the determining factors to be considered in estimating this maximum demand is the relationship of one type of load to another. By this, I mean that a range load and a lighting load, for instance, should not be considered as additive but as separate items because of different time elements involved. On the same basis, small appliance load and range load should be additive. Water heater load should be additive to practically any type load. We are, of course, discussing single-family residential use only.

Clothes dryer load and lighting load should not be additive. In my opinion, only one-half of the range demand of 8 kw should be additive to the dryer load as it is logical to assume that the oven might be used concurrently with the dryer. The surface units are not likely to be in use at the same time. The relatively small amount of hours usage per week of the average clothes dryer makes this type of load very easy to absorb into the maximum demand of most installations with practically no increase in copper requirement.

Let us take a hypothetical case. Present load is a 12-kw range, 1,200-sq-ft floor area plus a 3,000-w water heater. Demand per NEC requirements would be 8 plus 3.2 plus 3 and 1.5, a total of 15.7 kw, or a No. 4 type R service entrance conductor. Suppose the resident adds a 4.6-kw dryer. This would bring the demand to 20.3 kw and require changing to No. 2 type R conductors.

In my opinion, for the nature of the added load being considered, the existing No. 4 service entrance conductors would prove to be more than adequate for the maximum demand of this job.

On the theory outlined in the preceding paragraph, it would be figured as follows: one-half range demand or 4 kw, water heater 3, dryer 4.6 plus 1.5, for a total of 13.1 kw, well under No. 4 type R wire capacity. I do not think that a 15-minute maximum demand reading on this job would be anywhere near 13.1 kw total. I feel that it would be very much smaller.

After considerable observation of power companies' transformer capacities for various homes and from observation of numerous jobs in the field, which have supposedly been greatly overloaded according to NEC demand factors for various loads and yet have had no fuse troubles over a long period of actual use, I know that the estimated demands are not factual.

Let us take the original load mentioned in our hypothetical case above. Figured on the theory stated, it would be 8 kw plus 3 kw plus 1.5 for a total of 12.5 kw and requiring only No. 6 type R service entrance conductors. These figures, in my opinion, are much more in line with practical installations. I am confident that a maximum demand survey in the field would prove them to provide a large margin of capacity.

I believe this is one of the realistic approaches to the increased sale and installation of electrical appliances we are striving for.

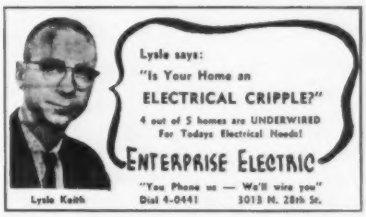
Our codes are primarily concerned with safety and as long as our service entrance conductors are properly fused there is no hazard involved that I can see.

The provisions of No. 6 minimum service entrance conductors and a 60-amp minimum size service disconnect is fine. Where we are missing the boat, I believe, is by limiting too restrictively the amount of connected load a consumer can connect thereto. Let us stress more the proper overcurrent protection for the conductors and try to use more common sense in our maximum demand requirements.

I have used one hypothetical case for illustration. We could go on and work out hundreds of cases along these lines. However, that is not my objective. The main purpose is to bring out for discussion and consideration by all phases of the industry the matter of maximum demands of various loads. I feel strongly that the answers are obtainable by a small amount of field research.

In the meantime, let us be progressive minded and liberal enough to try some of these installations in the field where it can be determined definitely whether it is practical or not, without any increase in the hazard involved and with no lessening of our safety standards.

I feel that the results obtained would be very much worth the effort. Possibly we can be credited with adding greatly to the success of the 1956 and future drives for the increase in the sale and use of electrical appliances in the home. We may be instrumental in making it possible for John Doe Public to derive greater benefits from increased use of electricity, man's cleanest, cheapest and most convenient servant.



Here is a typical ad with brief message

Personal Suggestion

Small personalized ads in the Boise newspapers are bringing better results to Lysle Keith and his Enterprise Electric Co. of that city than space in the telephone directory. Naturally he keeps a listing in the phone book but decided to spend the money it was costing him for a display ad on a series of newspaper ads instead.

The ads all carry a picture of Keith with a short quotation from him. These hit just one idea about home wiring or rewiring at a time or plant an idea for some added electrical facility or feature.

Keith reports that considerable residential alteration work has come to him as a result of this advertising which seems to catch the eye of Boise readers. The space used is two columns two inches. The accompanying reproduction shows a typical ad.

Johnson

"Estimatic" - - -

Electric brains do the contractor's most tiresome work

Ralph Johnson

President, Sturgeon Electric Co., Denver

If any electrical contractor was asked what single problem in his business he would most like to solve I think he would agree that estimating is the one. Furthermore I think he would agree to these specifications as to what he would like to accomplish by his estimating system.

It should:

1. Enable him to estimate more work;
2. Eliminate errors and omissions in his estimates:
3. Make the job run more smoothly from better estimates;
4. Reduce trips to the job site for supervision or to deliver materials;
5. Eliminate ordering a lot of excess materials;
6. Minimize his warehouse stock, and hence storage space;
7. Standardize his purchasing;
8. Enable his men to do the same job the same way each time;
9. Cover his overhead and give him a sense of security about it;
10. Turn out estimates with an assurance that if he gets the job he can perform it at a profit.

We have been using a system now for over a year developed with these solutions in mind. We have talked it over with the leaders of the industry to check it for any difficulties or lack of soundness. Likewise, we have put a lot of money into developing it.

All things being equal, I think we have found the answers to these ten specifications above. If I were to put it into a single sentence it would be this:

If we can speed our estimating from 50 to 80%, increase the accuracy of all estimates, prepare more accurate bills of materials, have installation standards followed in all operations, release material to the job in a consistent flow, and have an overhead control system over the entire operation, then I would say we have found the answer to the major problem of contracting.

Estimating, as you know, requires a detailed take-off of all materials to be used in the job, then the application of labor units to them to prepare the final sum. Our method has been to simplify this take-off both in time and effort by standardization of a great deal of it. In this way we have been able to save from 50 to 80% of the estimator's time. Likewise, we have prepared estimates that fit the job.

Since all estimating relates to material, the basic idea is to: (1) list all the material items, (2) cost them in dollars and in man-hours required to install, (3) total these amounts, (4) summarize them and add the job factors to get the total for the bid.

Several thousand items of material go into each job and the standard procedure has been to determine what these materials are and the value of them, and then multiply both the man-hours and the materials to arrive at a conclusion.

However, since some groups of materials or assemblies of items are typical, we thought it possible to shorten this tremendous task by pre-estimating an assembly take-off as a unit. The magic of modern business machines has been used to speed the pricing and summarizing and doing it far more accurately than had ever been done or possible before. It also enabled us to subdivide the types of construction and typical assemblies into logical units.

We hope it is a contribution to the industry that will enable it to do a more businesslike job of this function than has been possible in the past. At first it was thought that it would require one of the business machines in each contractor's place of business. On further investigation we developed a method to codify the operations and arrange them in a manual which can be used by *any* contractor of *any* size. We have given the system the name "Estimatic" and we hope to have it on the market in a manner similar to such pricing systems as Biddle or Henderson-Hazel.

Subdivisions made have been as to classes of materials and into sections of the job. We find with it that it is no more of a task to take off a big job in seven or eight subdivisions than it would be in one.

After all, the biggest task in estimating is the accounting. It is practically impossible for an estimator to catch all of the multitude of items that go into a construction job without missing or overlooking a great many. That is, if he uses the ordinary estimating procedures. In our system a great deal of it is pre-estimated and coded. The task becomes one merely of adding up the number of units and totaling both the material costs and labor costs from the already estimated assemblies.

The system is fundamentally based on the assembly unit. This unit is composed of a group of items commonly used together and usually represented by one of the graphic symbols on the plans.

To give the information concisely for such an assembly unit a system of symbols has been developed using ten digits, either letters or numbers. These represent certain features of the assembly.

As an example, even a simple job entails work in several of 17 ordinary types of construction. To these we have given letters as designations. For instance, A represents work in free air, C on concrete exposed, D, deck-type construction, E, exposed on wood, F, flush, G, gypsum board, etc.

Our study has shown that there are more than 12,000 different materials that are possible to use in electrical construction and some 25,000 different assemblies that are typical. Some of these use as many as 18 items of materials among the bread and butter items alone.

By pre-estimating these assemblies and selecting, say, 400 of them as those most in use, we have found that after short practice most estimators and contractors can write the codes from memory with the letters and numbers.

For instance, in a switch assembly the code tells the type of construction, the kind of switch, its ampere rating, its terminals are defined, etc. Associated with each item of material is the contractor's cost and the number of

M-102-1000-7-55

ESTIMATORS WORK SHEET

JOB NAME ENGINEER NO. FLOOR NO. DATE PAGE OF ESTIMATE NO.

PLAN DESIGN	TAKE OFF QUANTITY	QUANTITY OF ASSEMBLIES	ASSEMBLY CODE 1 2 3 4 5 6 7 8 9 0	NOTES	MATERIAL UNIT	MATERIAL EXTENSION ADD	MATERIAL EXTENSION DEDUCT	LABOR UNIT	LABOR EXTENSION ADD	LABOR EXTENSION DEDUCT

M-104-300-6-55

FEEDER SCHEDULE

JOB NAME ENGINEER NO. FLOOR NO. DATE PAGE OF ESTIMATE NO.

Fdr. No.	Length of Run	From	To	Amp Code	No. Wire	Size Wire	Type Wire	Cond. Code	Size Cond.	Elbs	Bends	Pull Box	Pkg.	Term.	Hanger	Nipple		Code	Dis. Sw.	Code	Starter	Code	Tot. Cab.	Code	Panel Board	Code	MDP

Work sheet and feeder schedule above are the only forms needed. Material and labor data are all calculated on the manual page, below

man-hours required to install it. These costs are summarized and a total already calculated for the assembly.

In making an estimate the codes for each assembly are written on the summary sheet. There is a column that can be used to put the end column contractor's cost; another for the labor units. These are already calculated and include the setup cost associated with the installation.

We have found in these studies that there are at least eight elements of labor for electrical installation that apply to all materials. These are:

1. Study and check of the plans, 0 to 10%;
2. Ordering of materials and tools, 0 to 10%;
3. Receiving and storing materials, 2 to 5%;
4. Moving to the point of use, 0 to 5%;
5. Tooling for the job, 35%;
6. Measuring and layout, 2 to 25%;
7. Installing, 35 to 80%;
8. Cleanup, 1 to 5%.

These are percentages of the total time.

You will see that for only 20% of that 100% does the contractor have a direct bearing. Eighty per cent of it is the responsibility of the men working for him. Yet the contractor's 20% affects more than that. Because if he fails to organize his part properly (that is, the 20%) he can run up the cost in time on the 80%, over which his men have direct control.

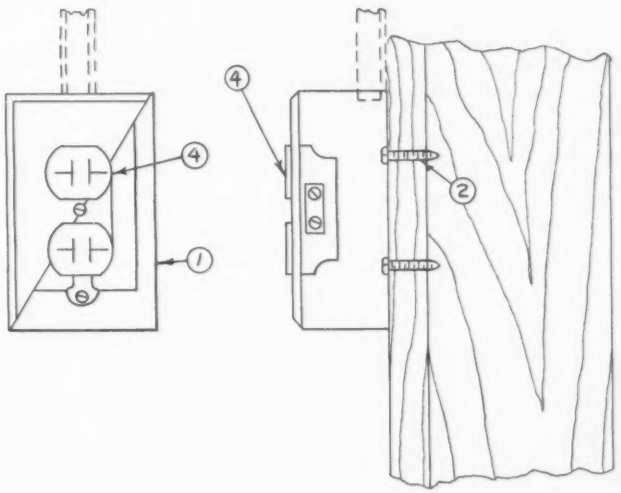
In setting up these basic units we had to make certain assumptions. Every job has some variables and some constants but in order to standardize we had to assume certain average conditions.

Labor units were developed from

BECO-M101

BILL OF MATERIAL FOR TYPICAL ASSEMBLY

KEY	NO.	DESCRIPTION	C	CODE	M.HRS	KEY	NO.	DESCRIPTION	C	CODE	M.HRS
①	1	BOX WMLD 5748	R	397116	0.400	②	2	SCR 8 SMTL 1 1-4HHP	H	132809	0.060
③	1	PL DR 1G ER MTL	D	498101	0.060	④	1	RECP 15 2W DUP BR	D	365212	0.150
		ALTERNATE MATERIAL FOR OTHER "RED" ASSEMBLIES CODED FOR TYPE "E" CONSTRUCTION									
3	1	PL DR 1G CHR	D	495101	0.060	4	1	RECP 15 2W DUP GRD	D	365265	0.150
3	1	PL DR 1G 040 BRS	D	498101	0.060	3	1	PL DR 1G IV	D	499101	0.060
3	1	PL DR 1G SS	D	497101	0.060						



INSTALLATION STANDARDS FOR TYPICAL ASSEMBLY

CODE RED1BSSE57 TOTAL M.HRS 0.670 BASIC UNIT 1 - RECEPTACLE, DUPLEX

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th Digit	9th Digit	10th Digit
R	E	D	1	B	S	S	E	5	7
RECEPTACLE		DUPLEX	15 AMP	BROWN METAL	SPEC. GRADE	SURFACE	EXP.ON WOOD	500 OR 700	
NAME OF ASSEMBLY		CLASS OF ASSEMBLY	AMPERE RATING	TYPE OF PLATE OF COVER	TYPE OF RECEP.	TYPE OF TERMINAL	TYPE OF CONST.	SIZE OF TERMINAL	
CODED FOR:			1	B-C-I-S	G-S	S	C-D-E-G-E M-R-S-W	5-7	

DRN BY [illegible] CK BY [illegible] DATE 2-56 INSTALLATION STANDARD NO. RED-05-04

field time studies. We find that: (1) the same labor unit always applies under certain specific conditions; (2) that the journeymen are of average speed; (3) that they use power tools; (4) that the contractor has the job set up so that there is no lost time either from material delivery or supervision; and (5) that the general contractor moves along at normal speed.

In the labor units we have included everything we feel is associated. It includes not only the bending and threading needed but takes into account the weight, the bulk, the area, volume, packaging, handling of materials, types of tools, types of construction and position relative to the floor. We have developed charts that plot these labor units.

Another basic advantage of the system is that we automatically provide standards of installation. These are drawn up in the manual and coded. This has three advantages: (1) each estimator takes off materials and quantities in exactly the same way; (2) the electrician installs it exactly as it is shown; (3) the purchasing agent buys and stocks the materials from them.

The Estimatic will have a section devoted to these standards. For each group of construction methods there will be a section. All will be illustrated. They will be identified by number and description and an explanation of what the code digits mean as they are found on each one. (See typical sheet.)

In estimating the contractor goes through the plan, counts the number of outlets of each type and puts down the quantity, and the code number for the assembly. Looking in the manual for these code numbers, he gets a summary of the material price and labor hours for each, applies the job factors to fit the geographic zone or type of construction, the local wage rate to the man-hours and the current prices furnished him for the materials.

The question often asked is, "What if the specifications for the job do not match those of the system?" In this case the estimator is furnished with sufficient reference material so that deviations from the standard can be worked out and the codes applied. The installation standards are part of the basic manual and consist of 415 drawings for all ordinary types of construction, including the material, alternate materials, an identification table, cross reference to manufacturers' code numbers, labor unit data.

Our experience has been that estimators soon write the code from memory. The total time to estimate is greatly reduced. The total estimate and total bill of materials are contained on four sheets.

What we have done is to change estimating from a process of tabulating and accounting to one of simple counting. Engineers love it and we find it very effective.

As a by-product of the system we have run across a method of estimating branch circuits that is fabulous. Ordinarily branch circuit estimating takes about 60% of the time of the whole estimate. We worked out a graphic plot form which relates the number of square feet per outlet to the number of feet of pipe per outlet and find it surprisingly accurate. It eliminates intricate measuring of pipe and wire and gives a quick estimate of the number of feet of each size conduit per outlet for two-wire or three-wire or other combinations.

We have always maintained that the bulk of overhead should be put on labor. It is the most important commodity that a contractor sells. If he applies his overhead to the labor charge, then he has control of the situation. We call it labor burden. In the estimate this is listed as labor burden at so much per hour.

To summarize, all Estimatic is predicated on a standard set of conditions together with job factors to apply after the standards have been determined. We have done over $15,000,000 in business in the last ten years, and feel we need this system very badly.

One of its greatest benefits is that the flow of the materials to the job is scheduled and nothing is overlooked. There is no other responsibility that compares with this in contracting.

Furthermore, for the first time in the history of this business the man in the field can have a manual of instructions with 415 drawings in it to show him exactly what was figured and what's in the shed for him to use on the job. It makes the job easy for him. It is well coordinated with the office and the plans and specifications.

Every day we are finding that the practical features of this system increase in value to us and far outweigh our original investment in setting it up.

Spokane NECA Builds Sample

That nothing proves a point like an actual example is one of the truest facts of life. Contractors are realistic sort of people. Put the two together and, in Spokane, the Inland Empire Chapter of National Electrical Contractors Assn. is about to prove that the electric wiring and lighting and appliances for an ordinary home do not run the cost out of range of an average buyer's pocketbook. Talk doesn't convince people that is so. But an actual example should. Hence it is building the example itself to prove it.

The house, called the Selectric Home, is nearly finished and ready to put on display for two months. It will sell for about $25,000, including practically every built-in electric appliance, as well as electric heat, planned lighting, continuous outlet strips, low-voltage switching, intercommunication system and a fire alarm system. Yet despite the fact that the electrical contract amounts to more than 28% of the total construction costs, the total cost only runs to the average of $14 per sq ft that prevails in that market and still contains all customary architectural features.

So that it would be an accurate comparison, no donations of materials or labor were asked for or accepted. Contractors bid competitively on all phases of the construction and materials were bought by them at customary prices. Whatever contributions being made by suppliers are to the advertising and promotion of the home in newspaper, radio, TV and brochure advertising. Washington Water Power Co. is directing the publicity and will staff the house with personnel to show its features during the public demonstration period.

Besides arousing public attention to the fact that electrical facilities for full electrical living with plenty of Housepower can be had reasonably, several other benefits are expected from this unusual project by an association of electrical contractors. Speculative home builders, it is thought, from this example, may be stimulated to include more electrical features in their homes as sales features. The house will also establish a fair cost yardstick for extensive electrical features in homes. Better electrical contractors, seeing the opportunities in a good electrical job, should also take more interest in residential wiring.

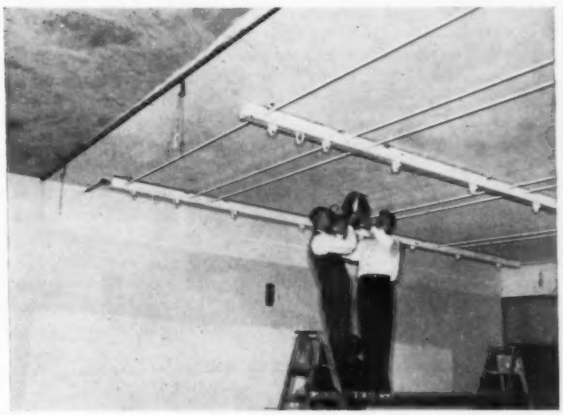
Electrical contractor who got the contract by competitive bidding is Rod Anderson of Rod's Electric. Pictures of the completed home and of many of its electrical features will be forthcoming later as well as more details as to all of its electrical facilities and its lighting design.

1. The pre-engineered lighting package was fastened to concrete slab roof-ceiling by powder gun driven studs in a planned routine

Luminous ceiling

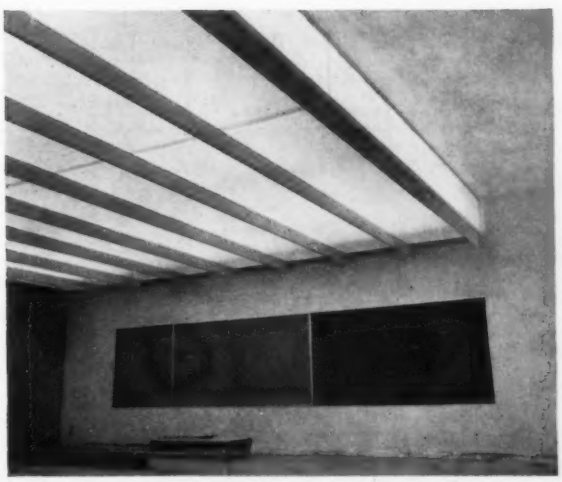
Brings Sky Indoors

Because sky viewed from within a classroom is relatively so much brighter than the ceiling, Architect Mario J. Ciampi designed the six-classroom Olympic elementary school in San Francisco to bring the sky into the room with a Wakefield luminous ceiling. It was one of the first in the area. Integrated into the lift slab simple cellular structural design, with the luminous ceiling included, the building cost about $12.85 per sq ft, less than prevailing costs at the time for conventional jobs. Electrical contractor was Emil J. Weber Electric. The pictures tell why—a packaged fixture made installation quick and held labor cost to a minimum.



2. Slab was painted with high reflectance paint. Charles Selby of PG and E and Ted Bakeman of Wakefield test the reflectance of it

3. Supports and baffles in place, John Lompa and Jack LaPointe, electricians, quickly roll in the corrugated plastic diffuser



4. Lighting unit was offset from the windows toward the back of the room to deliver most light where it was needed all day long

5. Looking toward the windows the inside sky and outside one seem to blend. Corridor overhang outside masks the direct sunlight

Electrical West—Vol. 117, No. 2

What About Electric Hand Tools?

—Grounding, Center of Confusion—8

Tom Hughes

Electrical Engineer, California Division of Industrial Safety

By far the greatest number of shocks and resulting injuries are being received from the use of tools that are held in the hand. This has been going on for years and is considered so serious that in 1938 a special committee of nation-wide scope was appointed by inspectors and insurance associations to study the problems involved. They reported in 1939. At the end of the war another similar committee was set up and reported on findings in 1947.

All of the discussion centers around the use of an additional ground conductor in the cord supplying the tool and an additional prong on the plug cap for automatically connecting the ground as the plug is inserted. In California this type of connection is required by law for tools used in places of employment.

The problem of complying with this requirement is difficult for tradesmen, carrying their tools from one job to another, because of the variety of connectors on the market. But, even where the tools stay at one job and receptacles are all the same type, we have a confusion of hazards.

The accompanying tabulation of 101 nonfatal accidents connected with the use of electric hand tools was personally investigated by the writer in the last five years. These were only in the territory covered by the writer: about one-eighth of the state. In California, employers are required to report all such on-the-job injuries.

The first class of injuries—those from flash burns—shows that more burns are received at the tool end of the cord than at the plug end. Investigation showed that in nearly every case where there was a grounding wire in the cord, the cord burned completely off after a short occurred at the tool. Apparently a more violent arc was supported because of the better path to ground.

The second class of injuries—those where power was supplied from small generators—does not indicate the growing use of generators for this purpose around construction jobs. Actually, such a means of operating with a system isolated from ground under normal conditions could eliminate most of the hazard of shock from difference of potential between the hand tool and adjacent grounded plumbing, ducts or any metal parts of the building.

With the generator power, a three-wire cord is still required to tie the frames of the different machines together. While this form of operation produces fewer accidents we see by this table that they are still possible.

The remainder of the table shows the number of shocks that were received by persons operating or getting ready to operate hand tools that were supposedly grounded or would be grounded if the plug were inserted right. There is another type of accident that happens occasionally but only happened once during this period to cause a reportable accident in the writer's territory. It is sawing into the conductors of the cord with a portable power saw.

Various predicaments evolve from this type of accident. The worst two are a violent arc causing flash burns to the careless user, or severing the ground wire and then welding it to the hot wire—thus leaving the case of the tool energized. Another feature of power saw shocks is that from 8 to 12 men in California are sawing bad gashes in the leg or groin every year, while they are "hung up" and struggling to free themselves from the shock. Of the 101 accidents listed here, over half were in connection with such portable saws.

What Is the Remedy?

Anyone who has followed this closely may have inferred that we are deliberately setting up a case against a ground wire for portable electric hand tools but this is not the case at all. We have another objective in mind.

Unfortunately, the statistics available to a safety engineer are seldom of any value in showing how effective his methods may have been. An agent for auto insurance likes to advertise the cases of tragic loss but he doesn't tell you about poor old Joe Doakes who has paid an average annual premium of $70 for 40 years and only drawn out an occasional small sum for a pitted wind shield.

The table doesn't show the number of men that may have avoided serious shock, falls from ladders, sawing off a

Portable Electric Hand Tool Accidents

Flash Burns:

Short circuit at plug end of cord	6
Short at equipment end of cord	20
Sawed cord in two	1

Injuries Caused by Electric Shock While Using Tools

Power Supplied By Movable Engine-Generator:

2-wire cords: Generator frame on wet ground; man on same wet ground	2
Generator frame intentionally grounded; man on same wet ground	1
3-wire cord from generator to tool:	
Caused by frayed strands at plug	3
Wires reconnected wrong	2

Power Supplied From Regular Public Utility Line:

Equipped only with 2-wire cord	11
Equipped with 3-cord but grounding not complete at source	10

Equipped With 3-Wire Cords—Normal Installation and Maintenance:

A. Caused by frayed strands at plug—	
Shock received from case of tool to adjacent grounded object	10
Shock received from metal plug ferrule to case of tool held in other hand	10
B. Fault in handle	11
C. Wires reconnected wrong at plug	5
D. Contacts of plug bent or filed by user and inserted wrong	4
E. Feed-back through ground wire in cord from fault at another location	4
F. 110-v plug inserted in 220-v receptacle	1

leg, etc., because the tools they used were effectively grounded when a fault developed. We are not advocating the disregard of laws that require the grounding of the cases of hand tools under normal conditions of use. Instead, we are proposing a much more desirable and effective solution.

The special committee that reported in 1939 came to the conclusion that it was desirable to ground the hand tools unless they could be adequately insulated instead. That insulation, if available, could be accepted as a more desirable alternative. The special committee that reported in 1947 reached identical conclusions. After a thorough study of accident records from all over the nation they pointed out all the same types of mishaps as shown here.

In the 15 years that have elapsed since the first committee met we have made not one bit of progress in design, but probably twenty times as many people are using hand tools now. On the other hand, manufacturers have ample means available today for solving the problem.

A coating of tough rubber could be vulcanized over the surfaces of metal cases just as it is being applied to portable "Jay Boxes" and parts of vacuum cleaners. The cases of tools, or even just the handles, could be made from suitable plastic, just as are steering wheels and controls in autos.

Electrical faults do not occur in the motor portion of the hand tools under normal use. They occur in the handle or where the cord enters the handle. The switch and connections are always crowded into the handle and this is the source of most of the trouble. So what we need are insulated handles and operating controls and our troubles would be over. The rest of the tool could be made as it always has been made.

To this you may say, "What about the remote chance that a fault will occur in the motor case?" Our answer is the suggestion to go back and review all aspects of this problem again (just as these special committees did) and see that use of a ground wire can contribute to many types of accidents at the same time that it may avoid some accidents. We have tried to show that in wet conditions a small current may take a side path through the operator even if the grounding facilities are perfectly in conformance with codes. Notice in the tabulated accidents that there were 13 reportable shocks received from the tool to some grounded object, even though the tools were supposedly grounded.

We can say, without reservations, that the first manufacturer who provides suitable insulating features in his hand tools is going to have the safety engineers and electrical inspectors selling his product for him. This is a serious problem and merits the consideration of manufacturers, dealers and employers, as well as safety engineers and inspectors.

The reader will understand, of course, that we are referring to electric tools that are held in the hand and not to the multitude of movable or mobile machines that are fed by flexible cables or cords. These machines must still be supplied with an additional conductor for fault current return path but the impedance of the return path must be kept low to be effective.

In the next article we shall try to clear up some of the confused ideas about static electricity in industry and present some of the possible solutions.

Children look directly into windows to see projected pictures without glare; they put . . .

Dark Glasses on the Building

By putting dark glasses on the building instead of the children one of the major difficulties in school lighting seems to be eliminated in the simplest, most economical manner. In the Gladstone school at Norwalk and the Fillmore Junior High school Foster Sampson, electrical engineer, Los Angeles, tried out a smoked glass called Lo-Trans, a double-strength glass, neutral in color, that has a transmission factor of 12½% for the viewing strip portion of the classroom windows. Ordinary glass was used in the upper ventilator windows that are in the shade of the outside overhang. In this way all interior brightnesses are kept within the range prescribed in the standards of the National Council of Schoolhouse Planning. Electric lighting is depended upon for illumination, with some daylight filtered in within the comfort range.

Significance of this simple means to control daylight brightness is that the glass in window areas in many schools that have been poorly designed can be replaced by such smoked fenestration at a comparatively low expense. Damaged venetian blinds and louvers or other means originally installed to control daylight can be eliminated. A continuous burning fluorescent lighting system can be installed to give comfortable seeing all day and be available at night for night classes, etc. In the two schools mentioned, Sampson designed for six 4-lamp semi-indirect fixtures but later schools are having nine 2-lamp fixtures to lower ceiling brightness and give better distribution. Other advantages: while the children inside can see out, those passing outside cannot see in; with lights off audio-visual pictures can be shown; desks can face any way.

The photo above does not show the tint in the glass as it really appears.

ELECTRICAL WEST

Sign Language

ELECTRIC signs have taken the promotional spotlight in Utah Power & Light's territory. The company has prepared an attractive brochure entitled "Identify Your Plant With Electric Signs" to stimulate customer interest in the use of lighted displays. The story is told through the use of dramatic pictures of its customers' plants and buildings that make good use of outdoor electric signs. The text not only describes the sign and gives the wattage involved but stresses the value of such type of advertising in stimulating brand identification, spotting plant locations and attracting customers. The brochure should prove to be a good sales stimulator.

This is the first piece of promotion prepared by a utility and directed specifically at the electric sign market that has come to to our attention. It suggests that there might be other phases of load building that have been too long neglected as possibilities for similar promotional efforts.

A new look at some of the old, taken-for-granted types of load might show them to be worth recultivating.

Who's Winning?

THERE has been much loose talk about the probability that the United States is falling behind in the nuclear power race. The hard, cold and disconcerting fact is that the standing of the competitors cannot be determined with assurance. It is doubtful if anyone on this side of the Iron Curtain has more than the vaguest notion of just how far Russian nuclear technology has progressed. It would be unintelligent not to assume that Russian scientists are making an all-out effort, that they are competent and that such research and industrial facilities as the Soviets possess are at their command.

Unfortunately the only actual basis for measurement is strictly unilateral. There are some, of course, who feel that the free world's nuclear program is not moving as fast as it should. The record does not particularly support this contention. The Atomic Energy Commission and the U. S. industry are advancing together on a broad approach to practical atomic applications. Five different types of reactors are well beyond the discussion stage. Government laboratories, our educational institutions, the facilities of hundreds of leading industrial plants and literally billions of dollars are being concentrated on the development of the atomic program.

In racing circles, heredity and past performance are two of the major criterions in picking winners. On that basis, and in the absence of any real factors about the competition, betting men very likely would be willing to make a reasonable wager that the American industrial system will not be far behind at the wire in any kind of technological race.

Professional Standing

THE Engineers Joint Council has released a report, in booklet form, on the subject of raising professional standards and improving employment conditions for engineers. The report frankly faces the fact that "a trend toward collective bargaining by engineers, in spite of widespread reluctance to participate in such action, indicates the existence of unsatisfactory conditions." It further analyzes what engineers apparently feel are shortcomings in professional, personal and financial treatment.

Emphasizing that there is no simple solution toward raising professional standards or improving employment conditions for engineers, the EJC report makes seven recommendations: that

1. Management utilize the services of engineers more effectively and thereby afford them the opportunity for advancement and economic improvement.

2. Management recognize its responsibility to make engineers feel that they are a part of management.

3. Management survey areas of communication, recognition and salaries and, where found wanting, correct to conform with standards of professional practice.

EDITORIAL VIEWS

4. The engineer take inventory of his services and his actions to make sure that he has a professional attitude toward his work.

5. Engineering societies establish and employ appropriate means to maintain high standards of ethical conduct for professional achievement.

6. Engineering societies encourage the professional development of their members and promote proper recognition of the profession.

7. Engineering educators emphasize the characteristics of the profession.

Representing as it does the labors of many thoughtful people, the report represents a significant appraisal of employment factors that deserve attention. As such it is recommended reading for all executives who employ engineering talent.

Impatient About Housepower?

JUST because the industry is spending several million dollars in the promotion of Housepower and to inspire people to Live Better . . . *Electrically,* a good deal of realism is needed in respect to expected results. For one thing, although everyone in the industry may have heard the story and be sold on it, after all the public has only begun to be told about it. The ads just began to appear in May. The public has been getting along somehow on its inadequate wiring for years. Hence any program of following up leads should be entered into with the realistic appreciation that it is going to take a lot of time and a lot more effort before enough tangible results are obtained to pay for this investment.

THE competitive status of nuclear power cannot be appraised until actual construction and operating experience is in hand. Toward this end, it seems apparent that just as soon as a promising reactor type is ready for full-scale development its design and construction should be pushed forward. This is consistent with our actions to date.

Seven full-scale atomic power plants are now specifically headed toward construction and operation between 1957 and 1962. After operating experience with these, we are going to know a lot more about the competitive outlook for atomic power. Consider the next five to ten years as a shakedown period. During that period, build and operate those plants that will contribute to our technology and from that experience map our future program.

My concern is that we face squarely the fact that nuclear power plants are still far from being "off-the-shelf" items. These plants and the equipment that comprise them are in an initial development period. Our current military and commercial atomic power programs already impose a heavy drain on our resources of qualified technical manpower and industrial know-how. We must avoid spreading ourselves so thin that advancement of the art is sacrificed to an expediency which is not consistent with the true needs of our country.

It is my belief that the electric utility companies, working closely with power equipment manufacturers and the Atomic Energy Commission, will act as a very effective and realistic governor on our industrial atomic power program. Given the maximum encouragement of government, including a legislative solution to the third-party liability problem, I am confident that responsible members of industry will not permit the United States to move into any secondary position in the development of commercial nuclear power technology. When and where government assistance is needed will continue to be clearly identified as we move along as a team.—From the testimony given by C. H. Weaver, vice-president, Westinghouse Electric Corporation, before the joint committee on atomic energy on May 28, 1956.

Dierdorff
Pacific P&L

Setterstrom
Montana Power

Cawlfield
Pacific P&L

Ilch
Idaho Power

Thomson
B.C. Electric

Coombs
Washington WP

New Methods Interest Nelpa Group

Electronic data processing, training accountants and employee relations dominated the general sessions of the Accounting & Business Practice Section conference of the Northwest Electric Light & Power Assn. in Portland, June 21-23. In the two parallel sessions running all day June 22, many details of general accounting procedures and practices and experiences in the customer accounting field were aired through panel discussions and individual presentations.

J. R. Cawlfield, Pacific Power & Light Co., section chairman, opened the Thursday morning session as the 31st annual conference of the section. J. Clarke Baxter of that company headed the arrangements committee.

John Dierdorff, PP&L vice-president, welcomed the delegates on behalf of the host company. He told of the plans of four cooperating companies—Portland General Electric Co., Washington Water Power, Montana Power and his own company—to develop 2,000,000 kw at the Pleasant Valley and Mountain Sheep sites on the Snake River below Hells Canyon. These projects can bring in this much needed power by 1960, he said. He cited that there was opposition to the granting of the FPC licenses for these projects chiefly among public power groups who had brought so much pressure recently to get Congress to rescind Idaho Power's license for three developments in the Hells Canyon stretch of the Snake River. These people are not amateurs at opposing developments by private power, Dierdorff said, and their obstructive tactics are a distinct disservice to the people of the Northwest. The plans for these projects are well advanced and a start can be made immediately on the issuance of a license, he said.

MacKenzie
Pacific P&L

Blank
Haskins & Sells

Response by R. C. Setterstrom, Montana Power Co., president of the association, urged the delegates to maintain an open mind with respect to new accounting tools in the form of electronic accounting machines. The trend is toward these machines, he said, to supply management quickly and accurately with the data it needs to chart successfully the course of the company.

Later in the session, George MacKenzie, treasurer of PP&L, directed the discussion of Pacific's progress in electronic data processing. The company has on order a "Datatron" system, having completed a study that indicated substantial savings in many phases of his company's operation, and other advantages. He pointed out the necessity of any company considering the application of electronic data processing to its operation, making an extensive study to show whether or not it would be to the economic advantage of the company to install such a system. Some factors involved in such a study were emphasized by Virgil Blank of Haskins & Sells, San Francisco, whose company has published a booklet on data processing as a basic guide for the understanding and use of this new technique.

Other parts of Thursday's general session brought out a discussion of on-the-job training for accountants by F. C. Frost, Puget Sound Power & Light Co., and the benefits and procedures involved in financing customer's wiring, presented by Wes Dunn and Loyd Case, PP&L.

The other general session was held on Saturday morning and it included a panel on internal audit procedures, headed by R. B. McInnis, B. C. Electric Co., a discussion of loading charges to customers, by James M. Coombs, Washington Water Power Co., a resume of the many values involved in maintaining good employee relations, by J. H. Eddy, California Oregon Power Co., and a panel on the uniform

Caulfield Washington WP | **Clark** Portland GE | **McInnis** B.C. Electric

Eddy Copco | **Case** Pacific P&L | **Halliday** Utah P&L

interpretation of the classification of accounts, moderated by W. A. Drushal, Utah Power & Light Co.

General Accounting

With Harry L. Clark, Portland General Electric Co., in the chair, general accounting opened its morning session with a panel discussion on work order practices, with E. F. Wildfong, PGE, as moderator. On the panel were Louie Altman, WWP, Elmer Hoffman, PP &L, E. F. Duffy, Montana Power.

A method of accounting for licensed projects was explained by Clyde Sletager, WWP, and the morning session closed with a panel on pay roll loading, with Bruce Pearson, PP&L, moderator, and a panel consisting of J. L. Staines, PGE, K. E. Hutchinson, Copco, and R. N. Davidge, Puget Power.

In the afternoon session, M. M. Ilch presented a paper on economics of investments. The session closed with two panel discussions, one on continuing property records with Larry Duff and Frank Hussong, Copco, as moderators, and one on materials and supplies with D. T. Thomson, BCE, in the chair. Panel members were: John P. Sullivan, Montana Power, R. E. Alworth, Idaho Power, Emil Jensen, Puget Power, George Purdy, PP&L, R. P. Colton, PGE, and Henry Buma, UP&L.

Customer Accounting

Clarence A. Caulfield, WWP, presided over the session devoted to customer accounting, introducing a panel on credits and collections, with L. W. Underwood, UP&L, as moderator, and Richard T. Schatz, WWP, M. D. Cook, PGE, E. G. Richards, PP&L, as panel members. Richard T. Schatz, WWP, also had a paper on keeping credit history records.

In another panel in the morning session, Harold Abramson, Puget Power, moderated the subject, "Need for Better Personnel in Branch Offices," with M. C. Oliason, Idaho Power, L. E. Stairet, WWP, and Eldo Halliday, UP&L, participating.

In the afternoon, Fred C. Hessler, California-Pacific Utilities, moderated the panel on methods of keeping meter records, assisted by J. E. Turner, BCE, John H. Eddy, Copco, and J. T. Davidson, Puget Power. Ken Quiney, BCE, read a paper on methods of billing large power customers. The last panel of the day was devoted to a review of methods of final bill controls, with Russ Dalgleish, PP&L, in the moderator's seat, and W. N. Rowberry, Idaho Power, John H. Eddy, Copco, and C. C. Taft, PGE, as panel members.

The conference closed at luncheon, at which tribute was paid to Berkeley Snow, executive manager of the association, who is retiring Aug. 31, by R. C. Setterstrom, president. In his response, Snow reminded the group that he had entered the industry from the accounting field 43 years ago, in 1913, in the days when customer billing was done in the branch offices on Boston ledgers. From this device to electronic billing machines, the profession of utility accounting has come a long way, he said, and he urged the younger men present to look forward to many progressive changes that will be brought about in the next 43 years.

At this session, likewise, the nominating committee, headed by T. W. Fryou, PGE, brought in a report unanimously approved to recommend M. M. Ilch, Idaho Power, to be chairman of the section next year, with J. R. Sullivan, treasurer of Montana Power, to be vice-chairman. This will normally bring the 1957 meeting into Idaho Power Co.'s territory and it is tentatively planned to take it to Sun Valley. The 1958 meeting, therefore, would normally go to Butte.

Social events at the conference included the banquet and entertainment Thursday night, a get-acquainted coffee party for the ladies Wednesday morning, sight seeing tour and brunch at the Garden Club for the ladies Thursday, and a luncheon at a downtown tea room on Saturday, while the men were closing out the business of the conference. Trips offered to the delegates for Saturday afternoon included one to the Yale Dam of Pacific Power & Light Co., and one up the scenic Columbia River Gorge to Bonneville Dam.

Cawlfield Pacific P&L | **Baxter** Pacific P&L

Among utilities' commissioners attending a Mountain-Pacific breakfast during the NARUC convention were: seated, left to right, William T. Brooks, Ariz.; L. W. Seibrand, N. M.; Joseph Starin, Wash.; Pete Mitchell, Calif. Standing are: R. A. Allen, Nev.; H. C. Allen, Idaho; D. Hacking, Utah; R. C. Horton, Colo.; W. Hudson, Wyo.; W. H. Wright, Hawaii; and C. H. Heltzel, Ore.

Changing Times Alter Commissions

Changes in general economics together with advancement in technology are causing similar constant change in considerations of public utilities commissions across the nation. Evidence of this was found in the committee reports and talks presented at the 68th annual convention of the National Association of Railroads and Utilities Commissioners held in San Francisco July 24-27.

Attrition Factor

An example of changing times and ideas is in the Report of Committee on Public Utility Rates. The report states:

"The factor of attrition may well become a serious consideration in the field of electric power in the near future if, as everyone seems to take for granted, the demand for energy continues to grow at the present amazing rate."

The report says: "Attrition has been defined as the tendency of the rate of return to diminish gradually as plant facilities are added at current cost levels."

To meet this problem of adjustment to current costs of expansion, the report states, some commissions have adopted a year-end investment figure, some have increased the rate of return, arbitrarily or by formula, and others have encouraged the utilities to present their rate cases on the basis of a future year in order to reflect the future investment picture. Still another is to include plant under construction in the rate base.

The committee on valuation cited five recent court decisions in rate cases that have new approaches to the problem of valuation, but concluded this discussion with the reminder that more than half the states still use an original cost rate base and "provide equitable treatment for utilities under their jurisdiction by suitable adjustment in the rate of return, or perhaps in the test period."

On the subject of accelerated depreciation, the valuation committee reported:

". . . commissions in 23 states have considered this matter from an accounting standpoint. In all but two cases the commissions found that the tax reduction should be treated as a deferral by setting it aside in a tax reserve or restricted surplus account. This action seems to meet the intent of Congress of providing capital for expansion."

Association President Benjamin F. Feinberg told the assembly that there are vast misconceptions on the part of the public as to rates for nuclear power.

Feinberg said another problem that commissions will face as nuclear power enters the scene is the possibility that reactors will have rapid obsolescence. It will be up to the commissions to decide how the consumer and the stockholder should share the expense of this rapid obsolescence.

Nuclear Power Rates

On the question of the rates for nuclear power, Feinberg pointed out that there is no basis for a reasonable guess as to what the rates will be. He said operating costs of nuclear plants will initially be no less, and more than likely higher, than conventional fuel sources. Design and operating experience will undoubtedly reduce expenses.

In changing commission activities to conform with nuclear energy developments, the committee on nuclear energy in the electrical industry is advocating the creation of study committees in each state, made up of representatives of all state agencies concerned, including public health, labor and industrial commissions, to determine where new laws are needed.

D. W. Gunther, Mgr. Materials Engineering, points out some of the controls that make sure the quality designed into Westinghouse products is delivered to you.

How Westinghouse takes trouble out of your workaday world

Trouble-free equipment is no accident. At Westinghouse, the quality that keeps your equipment out of trouble starts on the designer's board, is assured . . . often enhanced . . . by material selection, and it is safeguarded by precise control of production.

Take one. Any Westinghouse product. You can't miss. From production order to shipping platform, this is *your apparatus* . . . its quality, *our responsibility.*

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

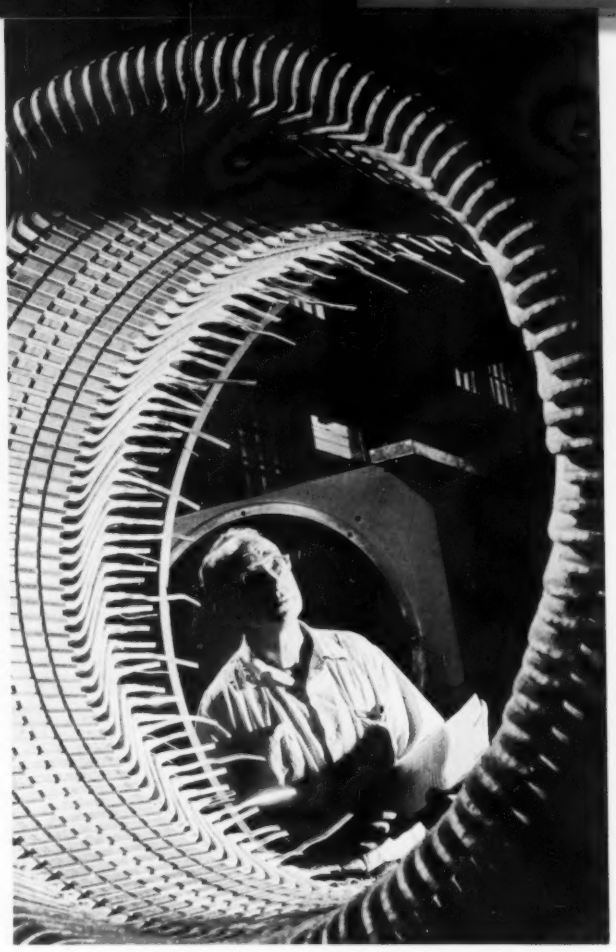
We're proud of the men who stake their reputations on these motors.

147 OK's, 26 double-check signatures say "it's right"!

That makes the Westinghouse powerhouse motor — available in ratings to 5,000 hp — the nearest approach to "won't fail, won't let you down" in the industry.

Indoors or outdoors, it is designed to do its job — withstanding dirt, heat, moisture, or loads beyond normal service requirements. Its materials are specially selected, many specifically developed, to meet unusually severe performance standards.

But our real point of pride is the conscientious check - on - check manufacturing procedure that culminates in 26 special in-process inspections, signed by responsible department supervisors. Your motor is right, step by step. Twenty-six personal reputations and careers are bet on it.



Supervisor of inspection signs the release — here an 800-horsepower, 10-pole induction motor is checked over to make sure Micarta® slot wedges and stator windings are perfect. Following this inspection, windings are tested for grounding.

High-frequency test — inspector tests for turn-to-turn faults as the rotor arm slowly revolves, inducing voltage into the windings. This check reveals any short-circuited windings, assures that coils are correctly connected.

Vibration test — balancing equipment checks rotor shaft, frame and bearing brackets for vibration, determines amount and location of imbalance.

WATCH WESTINGHOUSE

The new meter plant, specifically designed for meticulous manufacture.

A million out of a million are right!

100% inspection is key to uniform meter quality

You get uniformly accurate and dependable meters from Westinghouse for the simple reason that substandard units are not finished or shipped. The "go, no-go" test above, at line's end is no mere sampling. It checks *every* meter. The automatic full-load, light-load and power-factor test must be passed or the meter will not be shipped. Quality production with testing like this is one of the reasons why the Westinghouse meter is the only meter *guaranteed for life.*

Vibration and drop tests are conducted regularly to discover any possible source of damage in shipment. Specially designed packaging for Westinghouse meters has been awarded the seal of the National Safe Transit Committee.

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

Building quality is a way of life with men in transformer and voltage-regulator production.

Quality is a certainty . . . Every regulator is given a complete operation and insulation check prior to shipment. Here the CJ-1 relay settings get a final monitoring.

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

Proved on the production line . . .

Quality that's designed in, stays in

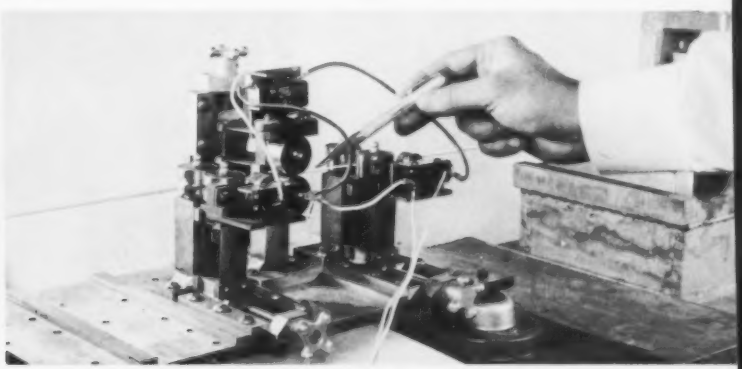
The heart of a program that has actually pitted department against department in plant-wide contests to assure manufacturing quality is this slogan: "Quality must be *built* into a product; it cannot be *inspected* into it!"

In addition, all Westinghouse foremen spend one week end each year attending a QUALITY SEMINAR where they exchange new ideas and experiences.

Quality control is more than a procedure at Westinghouse. It's an attitude, inspired by team spirit, proved by on-the-line tests. It's your best assurance that Westinghouse equipment will give you the trouble-free performance you want.

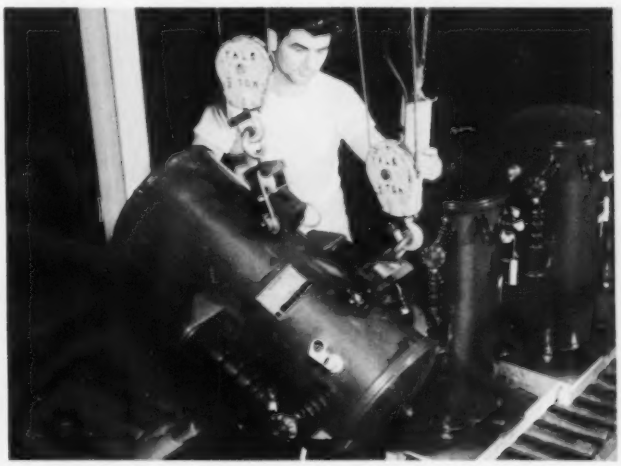
Basic "take it" ability of Westinghouse apparatus, mechanically and electrically, is thoroughly proved on the production line — far beyond service requirements.

Quality is wound in . . . High-frequency test checks turn-to-turn and layer-to-layer insulation both *before* and *after* assembly of transformers and regulators. Preassembly testing is vital, since insulating value of oil might temporarily hide flaws detectable only at this point.



Quality is 3,000 miles long . . . Minute burrs and imperfections on copper wire and strapping can damage insulation. That's why Westinghouse perfected a new system of detection that eliminates any flaw greater than 2 mils. With insulation at a minimum of 20 mils, the protection factor is better than 10 to 1.

Quality is three skins deep . . . Westinghouse "Coastal Finish," an exclusive three-layer protective skin for transformers, and regulators, forms a granite-hard, weather-resistant surface. Every transformer gets a minimum paint thickness test and a paint adhesion test.



Quality even upside down . . . Tilt test for transformers is the last check on the shipping room floor against oil and air leaks. Pressure tests are also applied before painting, and again after painting when the unit is filled with oil. Every transformer produced receives preproved performance checks like these.

While many production tests are complex, these are direct, simple, effective.

Trial by vacuum — entire interrupter chamber is evacuated to less than one micron with the vacuum manifold above as a final check on soundness of joints and seals; next operation, filling the unit with sulphur hexafluoride.

Trial by water — here the completely assembled interrupter chamber takes the bubble test. In this check, the chamber is filled with dry nitrogen to 30 pounds pressure; leakage, if it exists, is instantly detected.

Here a bubble is a sign of trouble

Westinghouse gas-type interrupters like the VLB switch can't tolerate leaks, or they're short-lived on your lines. Bubbles in water-immersion tests point straight to any potential source of trouble.

All valves and gauges are subjected to 30 pounds pressure with dry nitrogen and "dunked" to prove themselves before they get onto the production line. The operating shaft seal is given the same test and then, after complete assembly, the entire unit is again checked for bubbles.

To assure complete tightness of all joints and seals, the entire interrupter chamber meets a much tougher test. It is evacuated to less than one micron and held there for 20 minutes to check against any pressure rise.

Only then may it be filled with the sulphur hexafluoride which will effectively quench arcs through its long, dependable service life.

Precision manufacturing techniques, proved by simple tests like this, make the VLB interrupter safe for your system.

WATCH WESTINGHOUSE

Increased breaker ratings add importance to testing of components.

Quality to its finger tips

Power breaker contact tips take 12,000-lb. stress

The brazed joint between silver contact tip and Cupaloy body of every single breaker contact is stressed to 12,000 lbs. This test is made on all curved joints, from both directions.

Transmission of larger and larger blocks of power has sent breaker ratings skyrocketing . . . and the greater the capacity of the breaker, the more important it becomes that every component be checked for utmost dependability. That's why Westinghouse tests breakers, right down to their contact tips.

The business end of the interrupter contact in a Westinghouse De-ion® grid is a silver-tungsten tip brazed to a Cupaloy* body. Before assembly, every piece is 4 times tested for quality and strength of braze. The ability of the breaker to stand up to the mechanical stresses of high power faults and high-speed reclosing is preproved with the severe quality tests shown here. For instance, the Rockwell hardness test: After brazing and heat-treating, every single Cupaloy body is checked for hardness, to make 100% sure breaker contacts will withstand the punishment of short-circuit operation.

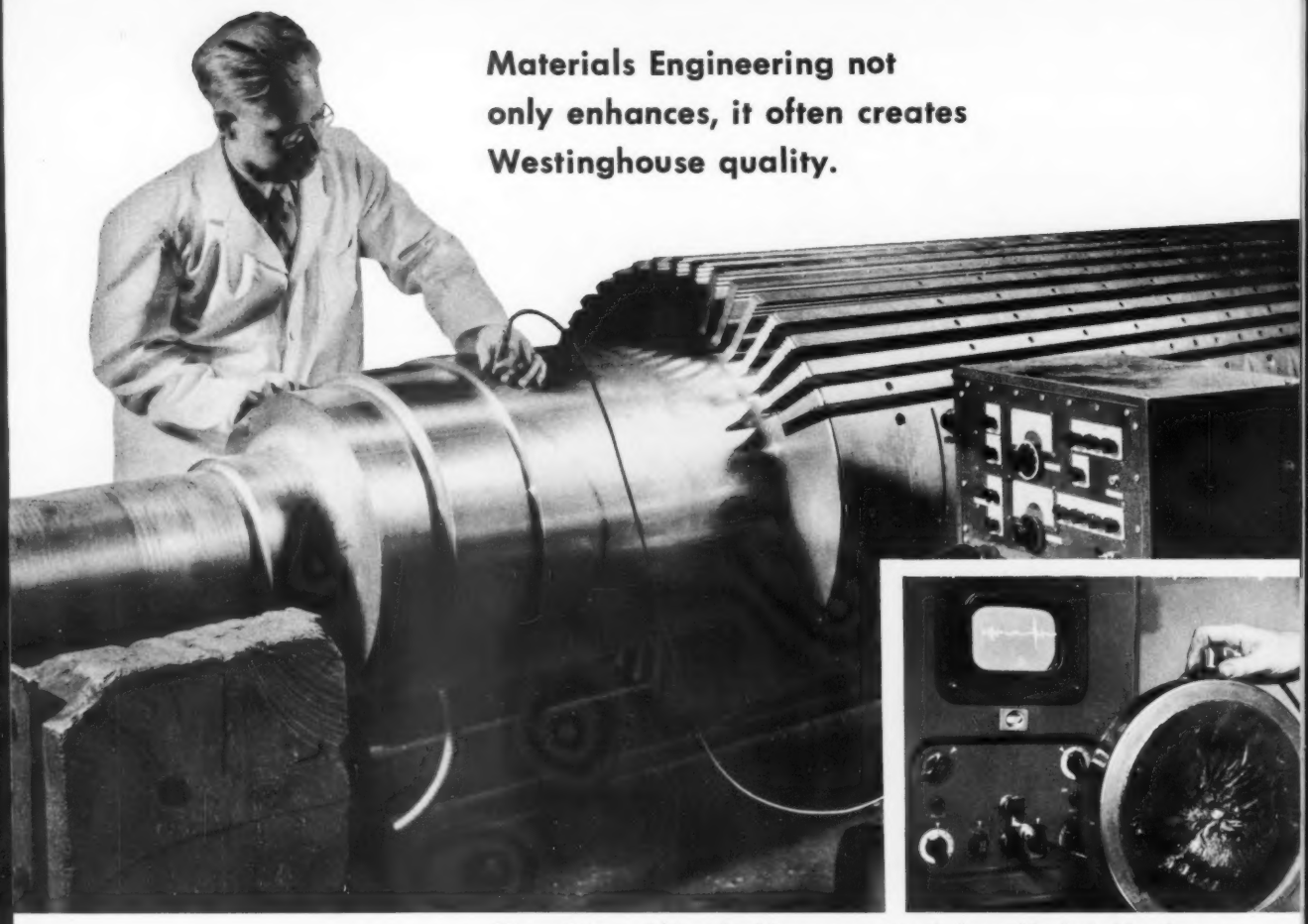
These are just a few of the tests Westinghouse breakers go through on their way down the production line. The doubts are hammered out — to give you all the performance that good design intended.

*Trade Mark

In the ultrasonic test, the electronic reflectograph proves that brazed areas are free of even microscopic faults.

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU!***

Materials Engineering not only enhances, it often creates Westinghouse quality.



Ultrasonic test — 34 feet of turbine-generator rotor is thoroughly checked in minutes by high-frequency sound. Cracks, inclusions or other flaws can be detected instantly in this production line, nondestructive test. (Right) Basic materials are also tested to design strength and beyond; they go into production a thoroughly known quantity.

Torture, look and listen

By this the finest material is selected . . . or developed

More than 260 full-time engineers and technicians utilizing a multi-million-dollar laboratory team up with the experienced design staff to give Westinghouse the foundation on which conscientious craftsmanship builds quality.

They set standards for basic materials and establish line checks by which standards are enforced. But more than that, they probe for new materials, new principles for solving design or procurement problems.

Thus, Westinghouse quality rests on a firm tripod: Top design engineering meets service requirements; materials engineering matches design demand; production faithfully meets the standards of both.

This facility of Westinghouse is unequaled in the industry. That's why it's right to say, "You can be *Sure,* if it's Westinghouse."

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*

CP 1036

PANORAMA OF THE PCEA

Committee Chairmen Plan Year's Program

Walter J. Maytham, vice-president of Westinghouse Electric Corp., assumed his new duties as president of the Pacific Coast Electrical Assn. on July 1. He announced the following appointments to set into motion the PCEA's 1956-57 program:

Engineering and Operating Section

Guidance Committee—J. F. Sinnott, San Diego Gas & Electric Co., San Diego, chairman; K. M. Bausch, Bechtel Corp., San Francisco, vice-chairman; D. R. Hoopes, Southern Nevada Power Co., Las Vegas, sponsor, Engineering Design group; H. J. Schomberg, California Electric Power Co., Riverside, sponsor, Overhead Transmission and Distribution group; W. L. McCabe, Sierra Pacific Power Co., Reno, sponsor, Communications group; E. W. Palmrose, Southern California Edison Co., Los Angeles, sponsor, Hydro Generation group; L. Bartholomew, Pacific Gas and Electric Co., San Francisco, sponsor, Meter group; F. F. Mautz, PG and E, San Francisco, sponsor, Steam Generation group; C. D. Mack, San Diego G&E, San Diego, sponsor, Substation group; C. R. Canady, So. Calif. Ed., Los Angeles, sponsor, System Operations group; R. L. Franklin, Arizona Public Service Co., Phoenix, sponsor, Transportation group; R. C. Blankenburg, So. Calif. Ed., Los Angeles, sponsor, Underground Transmission and Distribution group; W. E. Brown, Sierra Pacific Power, Reno, chairman, Accident Prevention committee; Charles Croft, Square D Co., Los Angeles, member at large; R. L. Engel, Allis-Chalmers Mfg. Co., Los Angeles, member at large; E. W. Morris, Westinghouse Electric Corp., Los Angeles, member at large; and G. R. Best, General Electric Co., Los Angeles, member at large.

Advisory Committee (Last five chairmen)—F. E. Bodine, Westinghouse, San Francisco; W. T. Johnson, CalElectric, Riverside; J. A. Longley, Allis-Chalmers, San Francisco; P. H. Adams, San Diego G&E, La Jolla; and Alfred Hansen, G-E, San Francisco.

Engineering and Operating Section will convene at the Hotel Statler, Los Angeles, March 21-22, 1957.

Business Development Section

Guidance committee—D. S. Aiken, Pacific Gas and Electric Co., Oakland, chairman; J. C. Chamberlain, Bureau of Home Appliances, San Diego, vice-chairman. (Balance of Guidance Committee to be named later.)

Advisory Committee (Last five chairmen)—Jack Kiedaisch, Arizona Public Service Co., Phoenix; J. A. Corlett, General Electric Co., San Francisco; W. F. Chapman, San Diego Gas & Electric Co., San Diego; V. C. Redman, PG and E, Fresno; and H. L. Moore, Southern California Edison Co., Los Angeles.

Agricultural Electrification Committee—J. C. Porter, G-E, San Francisco, chairman; D. W. Struck, San Diego G&E, San Diego, vice-chairman.

Home Economics Committee—Mary J. Kelly, Philco Corp., San Francisco, chairman; Dorothy S. Huse, Sues, Young & Brown Inc., Los Angeles, vice-chairman.

Commercial-Industrial Lighting Committee—C. D. Buchanan, Fluorescent Fixtures, San Francisco, chairman; C. E. Smoot Jr., Smoot-Holman Co., Inglewood, vice-chairman.

Commercial-Industrial Wiring Committee—Paul Henrichs, So. Calif. Ed., Los Angeles, chairman; G. F. Black, Rome Cable Corp., San Francisco, vice-chairman.

Home Lighting Committee—William C. Hird, Westinghouse Electric Corp., Emeryville, chairman; J. C. Blair, G-E, Los Angeles, vice-chairman.

Residential Wiring Committee—W. H. Bribble, Thermador Electrical Mfg. Co., Oakland; W. W. Bryan, G-E, Los Angeles, vice-chairman.

Kitchen and Laundry Committee—C. L. Neibel, So. Calif. Ed., Los Angeles, chairman, M. V. Musy, Westinghouse, San Francisco, vice-chairman.

Power Utilization Committee—W. L. Greer, PG and E, San Francisco, chairman; W. E. Vaughn Jr., California Electric Power Co., Riverside, vice-chairman.

Heating and Air Conditioning Committee—K. L. Hampton, Valley Electric Supply Co., Fresno, chairman; J. T. Bethell, So. Calif. Ed., San Bernardino, vice-chairman.

Administrative Services Section

Guidance Committee—J. A. Talley, California Electric Power Co., Riverside, chairman; W. N. Fairlee, Pacific Gas and Electric Co., San Francisco, vice-chairman. (Balance of Guidance Committee to be named later.)

Advisory Committee (Last five chairmen)—F. W. Mielke Jr., PG and E, San Francisco; J. T. McNab, Arizona Public Service Co., Phoenix; George Coughlan, PG and E, San Francisco; A. W. Althouse, Southern California Edison Co., Los Angeles; and Dexter Stoner, PG and E, San Francisco.

Topics for fall conference of the Administrative Services Section scheduled Nov. 14-15 in Santa Barbara:

1. Employee and Supervisory Relationships in the Accounting Department. Sponsor, B. C. Meith, California Electric Power Co.
2. Purchasing from Management's Viewpoint vs Buying from the Buyer's Viewpoint. Sponsor, Joseph Rensch, Pacific Gas and Electric Co.
3. Gearing Credit and Collections to the Times (to be sponsored by Southern California Gas Co.).
4. Establishing Measuring and Reporting Attainable and Actual Costs To Provide a Tool for Better Management (to be sponsored by Southern Counties Gas Co.).

Topics for the section's spring conference scheduled April 24-25, in Carmel are:

1. The Management of Cash. Sponsor, A. R. Cox, San Diego Gas and Electric Co.
2. Internal Auditing, (to be sponsored by Southern California Gas Co.).
3. Customer Relations. Sponsor, H. E. Welsh, So. Calif. Ed., Los Angeles.
4. Right of Way and Land, (to be

sponsored by Pacific Gas and Electric Co.).

General Committees

4-H Club Electric Project Committee—W. D. Howell, Pacific Gas and Electric Co., San Francisco, chairman; D. L. Turner, San Diego Gas & Electric Co., San Diego; J. W. Freeman, California Electric Power Co., Riverside; G. H. Sullivan, Southern California Edison Co., Los Angeles; W. C. Swinghamer, Westinghouse Electric Corp., San Francisco; W. L. Winter, Westinghouse, San Francisco; and B. D. Johnson, PG and E, San Francisco.

Highway Lighting Committee—H. F. Hartzell, Maydwell & Hartzell, San Francisco, chairman; O. R. Doerr, PG and E, San Francisco; H. G. Dillin, San Diego G&E, San Diego; and J. H. Mead, So. Calif. Ed., Los Angeles.

Highway Lighting Technical Sub-Committee—G. A. Trosper, PG and E, San Francisco, chairman; A. L. Pryor, So. Calif. Ed., Los Angeles; H. F. Hall, So. Calif. Ed., Los Angeles; G. S. Kimball, San Diego G&E, San Diego; Fred Swedenhjelm CalElectric, Riverside; E. L. Ralston, Hawaiian Electric Co., Honolulu; J. E. Hammond, PG and E, Fresno; J. H. Burson, Westinghouse, San Francisco; B. V. Kunde, Line Material Co., San Francisco; L. W. Luley, Westinghouse, Los Angeles; L. W. Towner, G-E, Los Angeles; and Peter Garippa, G-E, San Francisco.

Radio and TV Interference Problems Committee—R. L. Brinton, PG and E, San Francisco, chairman; P. H. Adams, San Diego G&E, La Jolla; D. R. Allsop, Southern Nevada Power Co., Las Vegas; N. L. Clarine, So. Calif. Ed., Los Angeles; A. B. Gilbertson, California-Pacific Utilities Co., San Francisco; W. L. McCabe, Sierra Pacific Power Co., Reno; and R. E. Marshall, CalElectric, Riverside.

Code and Ordinance Committee—E. S. Dibble, G-E, Los Angeles, chairman; J. G. Foster, PG and E, San Francisco, vice-chairman; F. B. Breedlove, San Diego G&E, San Diego; L. N. Bjerrum, So. Calif. Ed., Los Angeles. (Balance to be named later.)

Resolutions Committee—C. W. Leihy, ELECTRICAL WEST, San Francisco, chairman.

Budget and Finance Committee—E. D. Sherwin, San Diego G&E, San Diego, chairman; R. H. Gerdes, PG and E, San Francisco; G. N. Hawley, So. Calif. Ed., Los Angeles; L. D. Maechtlen, Square D Co., Los Angeles; C. C. Walker, G-E, San Francisco; K. C. Christensen, PG and E, San Francisco; and V. W. Hartley, PCEA.

Nominating Committee—S. W. Scott, Graybar Electric Co., Los Angeles, chairman; Albert Cage, CalElectric, Riverside; R. N. Drieman, PG and E, San Francisco; C. W. Goodwin Jr., General Electric Supply Co., San Francisco; H. F. Hartzell, Maydwell & Hartzell, San Francisco; J. H. Pengilly, Square D, Los Angeles; and E. D. Sherwin, San Diego G&E, San Diego.

Nelpa Schedules 1957 Meetings

Convention pressures on popular resorts and big city hotels in the Pacific Northwest have forced the Northwest Electric Light & Power Assn. to plan section meeting places and dates well in advance, according to Berkeley Snow, executive manager. Recent negotiations resulted in scheduling the 1957 conferences of two sections as follows: Engineering & Operating Section, Sun Valley Lodge, Sun Valley, Idaho, April 24-26; Business Development Section, Empress Hotel, Victoria, B. C., March 18-20.

The Engineering Section will be headed by J. H. Steede, B. C. Electric Co., as chairman, and his arrangements chairman for the Sun Valley meeting is J. F. Emery, Idaho Power Co.

Chairman of the Business Development Section is A. S. Gilbert, Idaho Power Co., his chairman of arrangements for the Victoria meeting is A. W. J. (Arch) Smith of B. C. Electric Co.

Inspectors Plan Salt Lake Meeting

Plans are shaping up for the 30th annual meeting of the Northwestern Section, International Association of Electrical Inspectors, that will be held Sept. 10 to 12 at the Newhouse Hotel, Salt Lake City. The general chairman of the meeting is H. S. Morr, Utah Fire Rating Bureau, who was only recently named first vice-president by IAEI.

The new 1956 National Electrical Code, expected to be available at the meeting, will be discussed and reports of code-making committees for future changes in the code will also be heard. A few selected speakers will give variety to the program and add authoritative information on timely subjects.

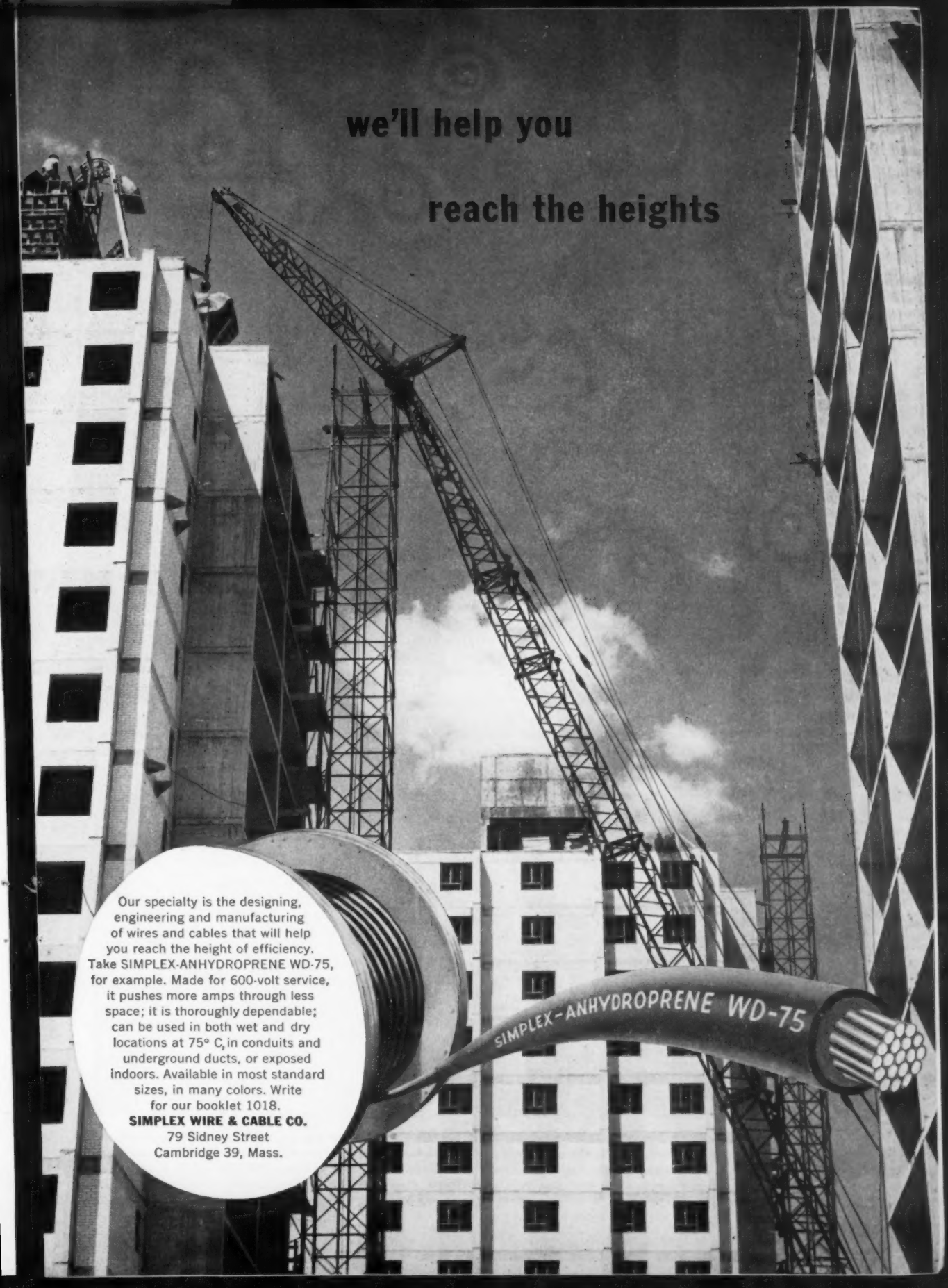
Educational and new product displays will be arranged around the meeting rooms in order to give those attending a view of latest electrical products and ideas. An outstanding program of entertainment is being arranged, featuring a visit to Brighton, winter and summer mountain resort.

The committee under Morr handling local arrangements includes A. H. Bywater, finance; W. A. Huckins, exhibits; J. H. Stayner, hotel and housing; L. B. Johnson, program; L. M. Christensen, publicity; Amos Bronson, entertainment; R. K. Williams, registration; Mrs. L. B. Johnson, ladies' entertainment; H. R. Schoepf, transportation; L. E. Baty, photographs. Hotel reservations are already being taken by Stayner. Address P. O. Box 412, Salt Lake City, Utah, or the Newhouse Hotel. National officers attending will include L. O. Trim, president, of Burbank, Calif.; H. G. Ufer, honorary president, Beverly Hills, Calif.; and Charles L. Smith, secretary-treasurer, Chicago.

Electric Clubs

Electric Club of Los Angeles terminated its year May 28 with the election of officers for 1956-57. George Larsen, Larsen Hogue Electric Co., was elected president to succeed Lawrence G. Maechtlen of Square D Co. Maechtlen served part of the last term also, when the preceding president and vice-president were both transferred out of the area. Richard L. Engel, Allis-Chalmers Mfg. Co., was named first vice-president; William B. Meek, Westinghouse Electric Supply, second vice-president; Howard Seidell, Pacific Telephone & Telegraph, third vice-president; Richard Gates, Rome Cable, secretary-treasurer and Albert W. Tracy, Anaconda, sergeant-at-arms. On the executive committee, besides Past President Maechtlen, are T. M. Blakeslee, Department of Water & Power; L. Dean Fowler, General Electric; L. W. Grayson, Glendale Public Service Department; and George N. Hawley, Southern California Edison. The club is recessed for the summer.

East Bay Electric Club in Oakland likewise closed the year with election of officers and heard a talk by Edgar L. Buttner, Scott-Buttner Electric Co., on "Cooperation for Industry Prosperity" reciting the Housepower, Live Better . . . *Electrically*, Operation Home Improvement and similar programs that will generate much electrical business. Elected president was William Gribble, Thermador representative, to succeed Frank Rothganger, PG and E. Vice-president is William Haley, General Electric Co., secretary-treasurer is Robert Wallace, Triangle Conduit Co. Directors are Stanley Parke, Westinghouse Electric Supply; Lynne Stanley, McMillan-Stanley Co.; Doug Aiken, PG and E, in addition to holdover directors William E. Derbyshire, Graybar; Charlie



Our specialty is the designing, engineering and manufacturing of wires and cables that will help you reach the height of efficiency. Take SIMPLEX-ANHYDROPRENE WD-75, for example. Made for 600-volt service, it pushes more amps through less space; it is thoroughly dependable; can be used in both wet and dry locations at 75° C, in conduits and underground ducts, or exposed indoors. Available in most standard sizes, in many colors. Write for our booklet 1018.

SIMPLEX WIRE & CABLE CO.
79 Sidney Street
Cambridge 39, Mass.

Matthews, Wesco, and Lee Misner, Foothill Electric Corp.

San Mateo County Electric Club celebrated its first year of existence by the election of new officers. Tom Savasta, Savasta Electric Supply Co., was elected president to succeed Tom Whittaker, electrical contractor. C. A. MacKenzie, Arrow-Hart & Hegeman Electric Co., was elected vice-president and Sil Chaippari, North State Electric Supply Co., secretary-treasurer. Installation was made at the June 5 meeting, at which T. Bocci, judge, South San Francisco municipal court, was the speaker.

San Diego Electric Club has moved its weekly meetings to Lafayette Hotel, formerly known as Hotel Manor. Meetings had been held in the Hospitality House at Balboa Park. F. M. Falge spoke at the June 11 meeting on the Live Better . . . *Electrically* program. A. H. Keith, superintendent of the city's electrical division, told of the radio system owned by the city at the June 4 meeting. Winners of the motor winding contest among high school students were awarded their prizes at the meeting late in May. M. R. Marston is president of this active club.

Victoria Electric Club held its annual golf, banquet and entertainment June 13 at the Royal Colwood Golf Club, Victoria. This club meets every Tuesday. F. E. Waring is its president, E. E. Gordon its secretary.

IES

Puget Sound Section heard Al Berg, Graybar Electric Co., and Don Olson, Wakefield Co., present "High Frequency Fluorescent Lighting Comes of Age" at a recent meeting in Seattle. Ken Dean, General Electric Co., headed the panel presentation. At the previous meeting in May David C. Miller, G-E, discussed aviation lighting.

Oregon Section, IES, held a recent meeting at the Oregon State College campus in Corvallis. Alfred S. Olson, chairman of the student chapter, reported on testing procedures for determining reflectance factors. Leo Chaffin, PGE street lighting engineer, discussed Portland's modern street lighting. Vidhurn Hongsumalya, exchange student from Thailand, discussed illumination techniques in his country.

Vancouver Island Chapter, IES, held a joint meeting with the AIEE recently and heard Kenneth Reid, city lighting superintendent, discuss 90 years of street lighting progress in B. C.

Election of officers was held on the last meeting of the current year, May 25. Following was a tour of radio station CJVI in Victoria.

Southern Colorado Chapter, IES, heard Arthur F. Weers, electrical engineer of Denver and Colorado Springs, discuss "Consulting Electrical Engineering in Colorado" at its June 19 meeting in Pueblo.

Golden Gate Section, San Francisco Bay area, met in Oakland at Jack London Square for a panel on "The Economics of Lighting." On the panel were Bernard Sabaroff, architect; W. H. Levers, Standard Oil Co.; C. T. Bakeman, Bakeman Associates; Robert Schwartz, Schwartz & Lindheim, contractors; and George Rabb, consulting engineer, was moderator. The section is considering publishing a new section directory. Harold Wright, consulting engineer, is chairman.

1956 Association Meetings Scheduled

September

10-12—**International Association of Electrical Inspectors, Northwestern Section,** Salt Lake City

17-19—**IAEI, Southwestern Section,** Claremont Hotel, Berkeley

17-20—**International Municipal Signal Assn.,** Denver

23—**NARDA** annual Profit Clinic, Bakersfield

24-29—**NECA,** national convention, San Francisco.

27—**NATA,** annual Profit Clinic, Benjamin Franklin Hotel, Seattle

October

1-3—**National Association of Electrical Distributors,** Pacific Zone annual convention, Westward Ho Hotel, Phoenix

7-10—**RMEL,** annual convention, Broadmoor Hotel, Colorado Springs

November

14-15—**PCEA,** Administrative Services Section, Santa Barbara

23-28—**San Diego Bureau of Home Appliances,** annual appliance show, Balboa Park

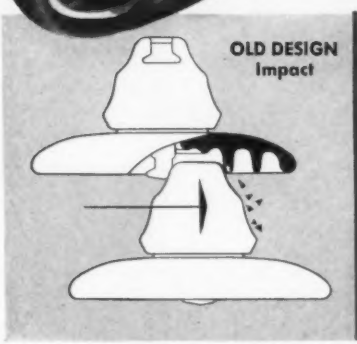
Doing their part to train more electricians for the electrical living age is the Solano-Napa Counties branch of the Northern California Chapter, NECA. Here are the graduating apprentices and the joint apprenticeship committee: Front row, six graduates, W. C. Bearden, Edward Mackley, James J. Archer, L. N. Wilkison, K. L. Christian, T. M. Jones. Standing: Herman Hale, apprenticeship coordinator, State of California; Clarence Feigel, business manager, and Glen Sandlin, president, IBEW local 302; E. W. Moody; Harold Pierce, Ed Pierce Electric Co., chairman, No. Calif. Chapter, NECA; J. E. Bell; L. J. Emmons; W. W. Case, instructor

TIME-TESTED AND FIELD-PROVED

Thomas

"CHIP-PROOF" INSULATORS*

- *eliminate impact*
- *eliminate breakage*



A close look at the two drawings points out the reason why. The Thomas design eliminates the cause of breakage. It prevents impact. Eliminate impact and you eliminate breakage. It's as simple as that.

In 1953, Thomas introduced the "Chip-Proof" insulator, designed to eliminate breakage caused by rough handling and assembling in the field. Today, utility service records have proved its worth in stopping breakage during assembly or disassembly of insulator strings. Here's why:

Thomas "Chip-Proof" design uses a "diverter skirt" — a heavy corrugation that can't break, designed with a contour that actually diverts the lower insulator or fitting away from the petticoats. No matter how roughly the insulators are handled, when the cap is pulled off the ball pin, it will first strike the diverter. This glancing blow deflects impact away from the lighter petticoats. Result: no chipping, no breaking . . . and a more rugged insulator.

Thomas "Chip-Proof" suspension insulators conform to the latest EEI-NEMA Standards (Classes 52-3 and 52-4) and are interchangeable with other units.

Throughout the country, wherever "Chip-Proof" insulators are now in use, their performance record speaks for itself. See your nearest representative today and ask for a demonstration.

Specify Thomas Insulators — The Best by Line Test.

*Patent applied for

The R. Thomas and Sons Co.

LISBON, OHIO

1873 THOMAS INSULATORS our 83rd year RELIABILITY 1956

General Electric offers new single-cycle BWR* for atomic power plants

Designed specifically to furnish energy for electric power generation

Forerunner of a whole new family of small power reactors, the General Electric single-cycle boiling water reactor is a new source of energy designed for power plants in a range of 5000 to 20,000 kw. It can be modified for larger ratings.

Boiling in the reactor itself and forced circulation offer these advantages:

(1) Simplified design; no main heat exchanger used. **(2)** High thermal efficiency. **(3)** Automatic control of response to load changes. **(4)** Greater safety since reactor is self-limiting in case of excessive nuclear reactivity.

This reactor uses fuel elements of the long-burnup type. Spent fuel elements are stored in the service pool adjacent to the reactor until cool enough for futher handling.

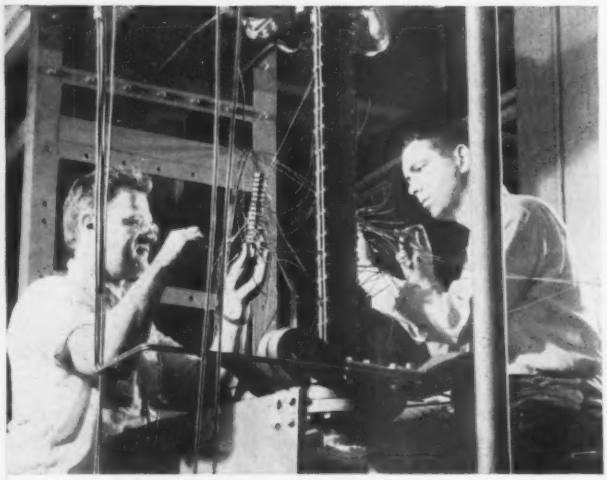
The reactor and service pool can be equipped for neutron and gamma irradiation for research without interfering with reactor operation.

For more information, write for bulletin GER-1220, Sect. 192-7, or contact the Atomic Power Equipment Dept., General Electric Co., Schenectady 5, N. Y.

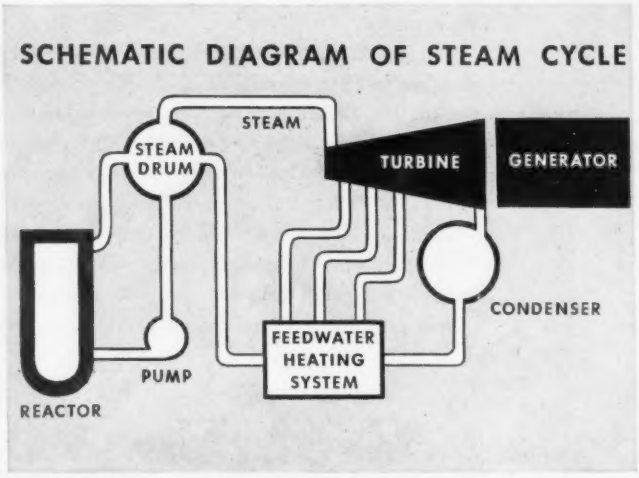
Boiling Water Reactor

Progress Is Our Most Important Product

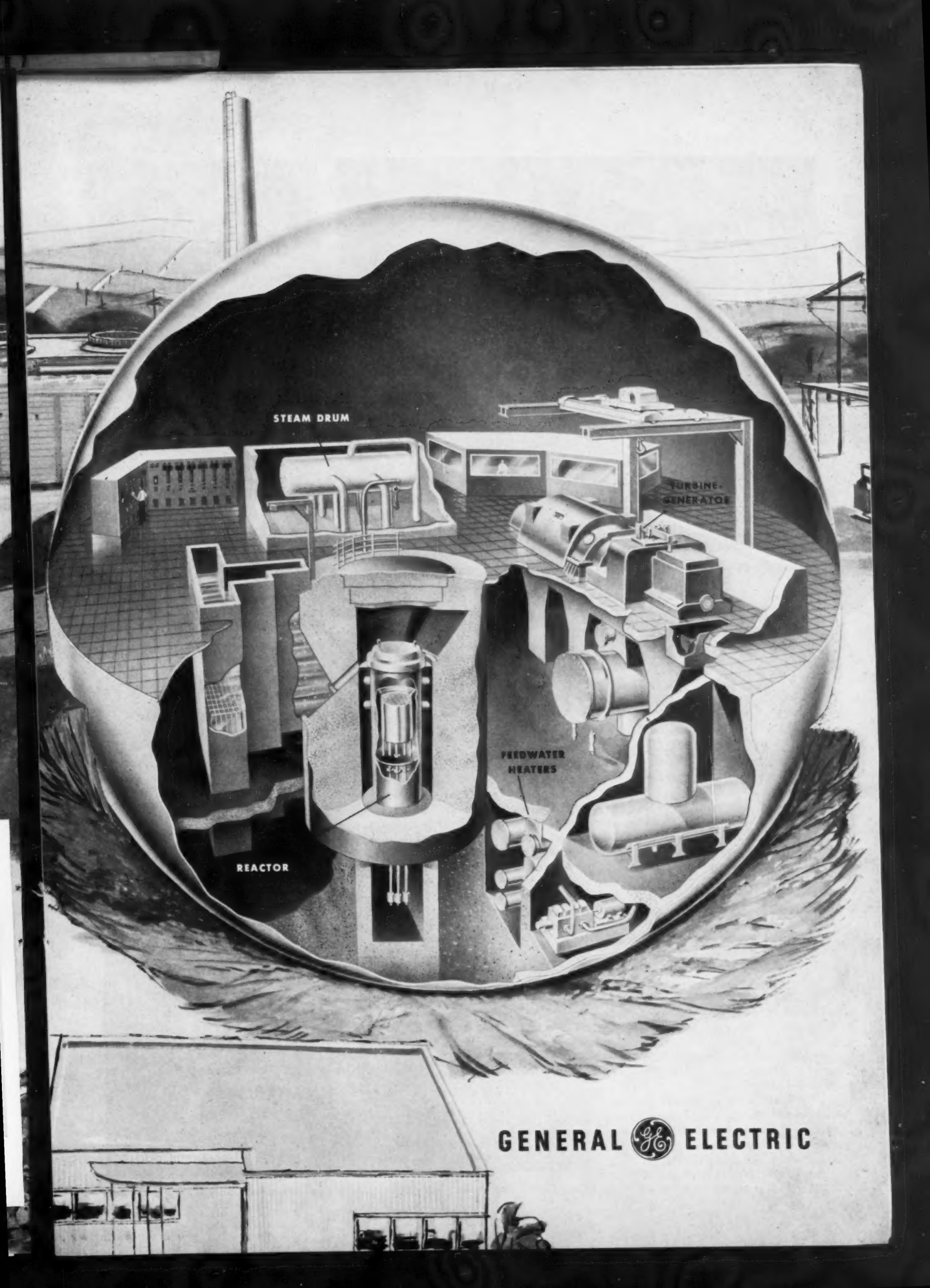
GENERAL ELECTRIC



SIMULATED FUEL ELEMENT being installed in a heat transfer loop for tests under reactor thermal conditions. This is one of G.E.'s supporting atomic development programs to advance reactor design.



STEAM FLOWS FROM REACTOR to drum. Saturated steam passes to turbine; water goes to feedwater heaters and returns to steam drum. Forced circulation pump provides automatic control of response to load changes.


STEAM DRUM
TURBINE-GENERATOR
FEEDWATER HEATERS
REACTOR
GENERAL ELECTRIC

Lucking and Miss Flores work out terms of the proposed multimillion-dollar purchase

Treasurer Jack Liecty gives finance briefing

Mary Lou investigates accounting system

Arizona Girls' State promotes

Free Enterprise

Officials of Arizona Public Service Co. recently enjoyed an unusual experience. They were negotiating for the purchase of a multimillion-dollar electric and gas utility that doesn't exist. The utility is owned by a city that doesn't exist, and negotiations were carried on by a mayor who isn't really a mayor.

This seemingly ridiculous situation is actually a top-notch public relations activity that has probably won Public Service some long-time friends. The company was participating in the annual Arizona Girls' State.

Mary Lou Flores of Nogales was elected mayor of an imaginary community called Saguaro City. The citizens of Saguaro, by unanimous vote, directed their mayor "to sell the municipal light and gas plant to your company," Mary Lou wrote President Walter Lucking.

"We believe that a private industry will be able to provide better service and meet future demands for expansion in our city than we can by trying to run the plant ourselves."

Lucking replied to her letter with:

"We feel that our experience here in Arizona would equip us to provide your city of Saguaro with the best possible utility service at rates that are consistent with sound business practices." What was more important to Mary Lou, no doubt, was that Lucking invited her to Phoenix to negotiate the transaction.

The pictures show Mary Lou getting a first-hand view of the type of operation her "Saguaro City" utility will have under private ownership.

Vice-president Forman greets the mayor

Complexities of a steam plant convince Mary Lou that selling utility is the thing to do

Can you more than triple the "life expectancy" of equipment?

Yes...and here's how Shell men and techniques help you do it with an inhibited insulating oil

Shell Research men knew that oil oxidation was the villain in much equipment deterioration. So they set out to develop an oil which would effectively "fight" oxidation—main cause of harmful acids and sludge.

To find the *perfect combination,* Shell scientists teamed and tested hundreds of specially-refined base oils with Shell's own oxidation-inhibitor. The one combination that proved *outstanding* was SHELL DIALA OIL AX.

This remarkable insulating oil resists oxidation so effectively, many users report it is still acid and sludge-free years after ordinary oils would have failed. Because of this you can get 3 to 5 times the usual service life on your electrical equipment—without frequent oil purification and costly maintenance.

First—and proven *best* in its field—SHELL DIALA OIL AX is just one of many fine products developed by Shell's 1500-man research team, a team with 25 years' experience in gasoline and lubrication problems.

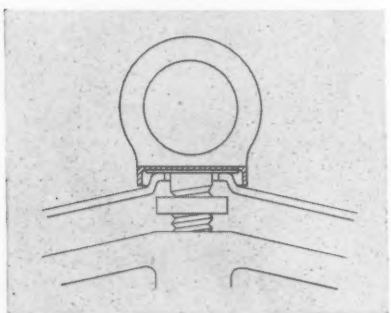
A telephone call can put this team to work solving your problems. Call in your Shell representative today.

SHELL®

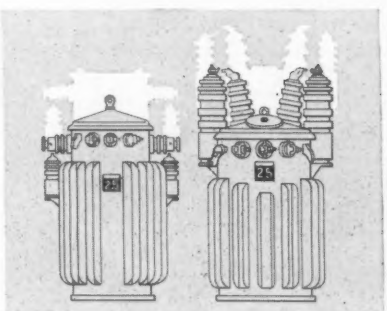
SHELL DIALA OIL AX

New Offset Breaker Handle . . . on new 1956 CSP transformers identifies new breaker trip settings increasing overload capacity 20%, emergency range 15%.

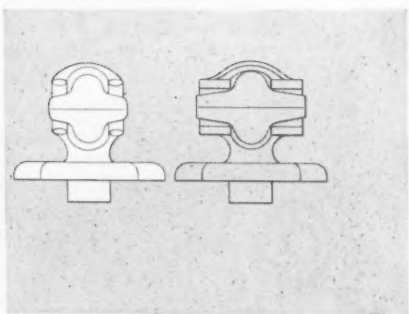
Simpler Overload Monitoring . . . new optional thermal-duty indicator records total overload hours for life of transformer; light and dial easily read from the ground.



Convenient Lifting Eyebolt (3-50 kva) . . . eliminates slings, chains, cable in mounting transformers; saves time. Each transformer gets production line pull-test at twice its own weight.



Exclusive—Reduced Height of All Transformers (15-167 kva) . . . you can replace present equipment with the next larger kva size on the same pole without change in hardware.



New LV Terminals for Aluminum or Copper Conductors . . . larger low-voltage terminal with captive bolt increases contact area, lowers contact resistance.

BUY A "BUSIER" TRANSFORMER...

Eight built-in timesavers give Westinghouse transformers capability to do more

Rating for rating, the Westinghouse transformer works longer while overloaded, giving you time—extra time—to do something about it.

In all new CSP® transformers, operating range has been increased 20%. This has been done without sacrifice of service life of the equipment. There's still more . . . higher breaker trip settings add 15% emergency capacity.

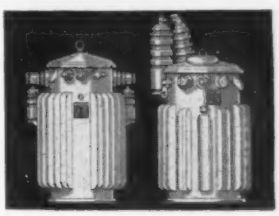
What do you get out of all this? Busier Westinghouse transformers give you more of a breather to make orderly change-outs in growth areas, or to handle unexpected peaks. Or to cope with emergencies in widely scattered places.

Easy and effective load monitoring on the conventional Westinghouse transformer is made possible with the optional new thermal-duty indicator. The indicator keeps tab on overload in two most effective and convenient ways. First, the red light goes on at the overload point. Second, the dial records total overload hours cumulatively. The story that the indicator tells comes straight from coil copper, the only true transformer-temperature indicator.

And what about installation? Below are shown a few of many other new features that simplify the job . . . right up to the time the lineman takes off his gloves.

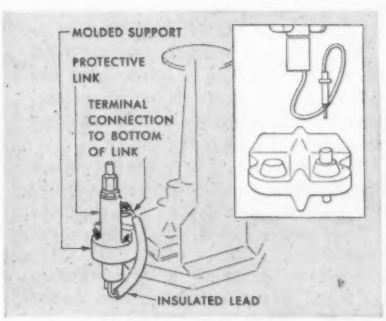
These are the things a really modern transformer can do for you. Call your Westinghouse sales engineer today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70769

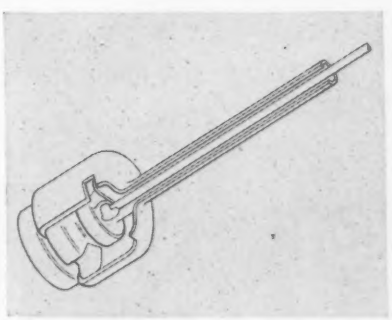


WATCH WESTINGHOUSE!

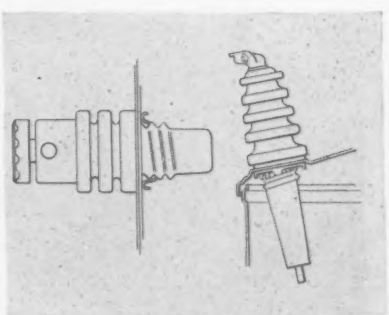
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*



Faster Change-out of Protective Link on All CSP Transformers—Wall or Cover Mounted . . . former major repair operation now simple, routine maintenance.



Prevent Line Lockouts due to short circuiting by birds and squirrels; new, optional plastic bird guard; snaps easily over cover mounted high-voltage bushing.



Better Bushing Seal, Simpler Maintenance . . . internally mounted, threaded high- and low-voltage bushings with spring grip nut.

THIS MONTH'S NEWS

Snake Figures Strong In Corps 308 Review

The pattern of the Corps of Engineers revision of the original 308 report was revealed in public hearings held in the Pacific Northwest in July. New attention is being given to the Snake River as a possible area for the Columbia Basin flood control storage and generating capacity that was the objective of the report.

Col. Myron E. Page Jr., Walla Walla District engineer, said at the hearing in Lewiston, Idaho, that the corps is investigating three sites on the Snake and one on the Grande Ronde. None of them was in the original 308 report.

Also up for consideration is to double the generating capacity of Bonneville by replacing the south bank chamber with larger locks on the north bank and enlarging the present power house. A proposal by Harvey Aluminum Co. concerning Bonneville is to widen barge locks to 86 ft, the same width as The Dalles and McNary.

Proposed projects on the Snake are:

- Clarkson project, a dam at Slaughterhouse Rapids to raise the river about 5 ft, with an installed capacity of 135,000 kw and a pool extending to a point on the river upstream from Asotin, Wash.;
- Asotin project, another run-of-the-river dam to raise the level about 100 ft, with an installed capacity of 360,000 kw;
- China Gardens, a potential site near Lime Point for a power dam that would raise the Snake 90 ft and back a pool to the mouth of the Innaha River and into the Salmon;
- Rays Ferry, a 555-ft high dam on the Grande Ronde to store nearly 1,000,000 acre-ft and produce about 135,000 kw.

All four dams would have fish ladders, and Clarkson and Asotin would have navigation locks.

Several southern Idaho communities petitioned for construction of a dam on the Snake near Murphy for irrigation storage and to generate electricity for irrigation pumping.

- **April-June runoff** on the Columbia River has been rated the heaviest in this century by Interior Department's Geological Survey. Observed runoff at The Dalles was 86,290,000 acre-ft. The runoff occurred without any major damage reported.

MAJOR STEP in the progress of Wyoming is symbolized as Dave Johnston, vice-president of Pacific Power & Light Co., moves the first shovelful of earth to begin construction of a new 100,000-kw plant near Glenrock that carries his name. Looking on is Paul B. McKee, PP&L president. The $20,000,000 steam-generating station will use Wyoming coal

Los Angeles Wants Hike In Utility Bond Limit

The Board of Commissioners of the Los Angeles Department of Water & Power has requested the Los Angeles City Council to place a charter amendment on the November ballot increasing the municipal utility's revenue bonding capacity.

Bond financing is at present limited to 50% of the cost of new construction. Effect of the proposed amendment would be to raise the limit to 55½%.

Board President Ben P. Griffith said the department has almost reached the limit of the amount of power revenue bonds that can be issued under the old formula, and is faced with the necessity of financing a $260,000,000 construction program for its power system within the next five years.

Lewis River Development Under Partnership Plan

Agreement has been reached between Pacific Power & Light and the Cowlitz County PUD on partnership development of the upper Lewis River.

Four months of negotiation preceded a final arrangement that gives the PUD 26% of the power output for 26% of the project cost, and the two utilities will negotiate and share in future upstream developments.

At the Swift project, already under construction by PP&L, the private utility will build and own the main dam and power house and the PUD will build and own No. 2 power house 3½ miles downstream. Maximum capability of the two plants will be 220,000 kw and 80,000 kw, respectively.

An important sidelight to the agreement is that the PUD commission has agreed not to press its pending condemnation suit against PP&L's existing Merwin and Yale projects.

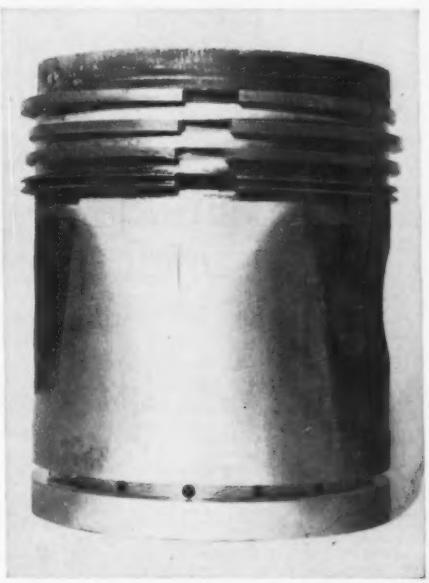
Two possible future projects are Muddy Dam and Meadows, currently being investigated by PP&L, that are to have potentials of 100,000 kw each.

- **Northern British Columbia Power** Co. Ltd., a subsidiary of the Power Corporation of Canada Ltd., has sold its power plants and distribution systems at Prince Rupert and Stewart, B. C., to the B. C. Power Commission for about $3,000,000.

Standard Engineer's Field Report

CASE HISTORY
LUBRICANT RPM Delo Oils
FIRM Del Este Water Company Modesto, Calif.

Engine powers pump for 28,000 hours—sleeve wear is less than 0.002 inch!



PUMPING UP TO 2200 GALLONS OF WATER PER MINUTE, a 165 h.p. natural gas fueled Waukesha engine ran 24 hours a day for more than three years in the Del Este Water Company plant at Modesto, California. Driving a turbine pump, it worked against a constant head, with speed controlled to maintain a set pump discharge pressure. In spite of this tough service, RPM DELO Special Lubricating Oil kept engine in perfect operating condition right up to time of inspection. Oil consumption actually was less for the last 8000 hours service than for the first 8000. Inspection showed sleeve wear only 0.001 to 0.0015" with no taper; crankshaft "miked" within factory standards. As shown above, rings and grooves are clean, sleeves unscored. Same sleeves and pistons were reinstalled and engine went back into pumping service.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

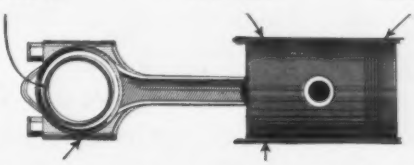
FOR EXPERT HELP on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative, or write to 225 Bush Street, San Francisco, California.

Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

Detergent keeps parts clean



Inhibitor resists foaming

Metal-adhesion qualities keep oil on parts in running or idle engines

STANDARD OIL COMPANY OF CALIFORNIA

Here are answers to your everyday questions on

ELECTRIC UTILITY

- rate fixing
- rate modification
- rate comparisons

Here is a comprehensive, practical treatment of the problems of establishing utility rates, covering everything from the economic nature of the utility to the fine points of actual rate making. **The effects of profit objectives, customer service and satisfaction, and technical and regulatory influences are emphasized throughout,** in an authoritative and clearly written guidebook.

Just Published

Electric Utility Rate Economics

By RUSSELL E. CAYWOOD
Manager of Rates, West Penn Power Co.

235 pages, 60 charts, tables, diagrams. $10.00

HERE is a book for the power salesman, the utility lawyer, the experienced rate man, and others, bringing them the complete story of electric utility economics, from technology to metering. Its fifteen chapters cover the **background** of the industry; **technical factors** influencing price structure; the **mechanics** of rate making; **short-cut methods** for estimating effects on revenue of price changes; **pointers** on developing a rate modification program; rate case **decisions** to help you understand today's regulatory thinking; **ways and means** of determining the economic relationship of several engineering problems; the **how and why** of metering, metering economics and load control. Here is comprehensive information for all concerned with the place of rates in utility economics and with sound methods of rate making.

Includes a number of diagrams and tables to give you clear-cut visualization of

Revenue dollar disposition
Trends of prices and electric rate
Service charge vs. the minimum charge
Instantaneous peak provisions
Variation of cost with metering voltage and load size
Thermal meter characteristics
Depreciation accrual patterns
Break-even point
And other factors

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Banks Talks on Policy Of New Resources Group

In his first major address since his appointment as California director of water resources, Harvey O. Banks has given some idea of how he will operate the new state water department which went into effect July 5.

Talking at the annual meeting of the California Central Valley Flood Control Assn. in Sacramento, Banks said in organizing the department two assistant directors will be appointed.

One will be in charge of engineering and the other in charge of administration and management.

"Under this top bracket," he added, "we plan to create five divisions: (1) resources planning; (2) design and construction; (3) project operations; (4) administration; and (5) project finance and management.

"We feel that this organization will be adequate to carry forward a comprehensive program of water development on a state-wide basis."

Banks told the group there is no reason to delay any longer a construction start on the state's $1.5 billion Feather River project.

"We are confident that we can start actual construction work on the Feather River project next spring," he added. The state legislature made available $9,350,000 July 1 for completion of engineering studies and acquisition of rights-of-way.

High Hells Canyon Dam Beaten by Senate Vote

Efforts of public power advocates to secure legislation in favor of a high dam at Hells Canyon were beaten in the U. S. Senate in July by a 10-vote margin. The issue is killed for this session of Congress, and perhaps permanently.

With the defeat of the bill came indications from Democrats that it will be made a major issue in the election campaign. Eight Democrats crossed party lines to help defeat the bill, two Republicans voted for it.

Power Cable Engineers Broaden Standards Scope

The Insulated Power Cable Engineers Assn. (IPCEA), which has since 1925 developed standards for many types of insulated power cable, recently announced a broadening of its field of activities by the addition of two new sections.

These sections and their respective scopes are: (a) Communication Cable Section, whose scope includes the design, construction, testing and application of insulated cables used in the field of communication, and (b) Bare and Covered Overhead Conductors Section. This section is concerned with the consideration of all matters in which the dominant factors are the design, construction and application of bare and covered overhead conductors used in the transmission and distribution of electric power.

Alcoa's Kemano Tunnel May Need Major Repair

An investigation of lowered water pressure from the 10-mile Kemano tunnel of Aluminum Co. of Canada is going to require dewatering, according to company officials.

Loss in head indicated "the probability of an obstruction near the center of the tunnel," company spokesmen said. The obstruction may have resulted from the closing of an access tunnel.

It is reported that power available from other sources will be sufficient to keep Kitimat smelters operating during the investigation and repair period.

WWP Talks of Purchase Of Lighthouse System

Another small distribution system may be purchased by Washington Water Power Co.

Bunker Hill Mining Co. owns and operates the Lighthouse distribution system in the Kellogg, Idaho, area and is "divesting itself of facilities no longer considered a direct and necessary function of mining," according to General Manager Wallace G. Woolf.

The system serves 2,400 residential and 350 commercial customers, and receives power from WWP. The WWP offer being negotiated is for $850,000.

Highest Tax Increase Placed on Colorado PS

The Colorado Tax Commission has fixed the assessed valuation of Public Service Co. of Colorado, the state's largest taxpayer, at $79,107,060 for 1956, compared with $73,856,510 in 1955.

It was the largest increase for any utility in the state. The valuation of all Colorado utilities, including railroads, for tax purposes was set by the commission at $347,988,800, up $20,000,000 from 1955.

Rural electric companies were boosted from $12,080,700 to $13,215,450.

Lighting by "DECIDEDLY BETTER" DAY-BRITE Lighting Fixtures makes the big difference...

Messrs. H. F. Ortlip, Wm. R. Govett, C. C. Cooley, C. P. Harvey, A. Kabakjian, of the Harry F. Ortlip Company, Philadelphia, Pa.

"An electrical construction company with the reputation the Harry F. Ortlip Company has gained can only have one standard of quality—the highest."

In achieving this high reputation they have always used materials and equipment of the best manufacture, which is demonstrated by their frequent use of Day-Brite fixtures.

"DECIDEDLY BETTER" DAY-BRITE Lighting Fixtures

Certified Lighting for a Better America

DAY-BRITE LIGHTING, INC.
5412 Bulwer Ave. • St. Louis 7, Missouri

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

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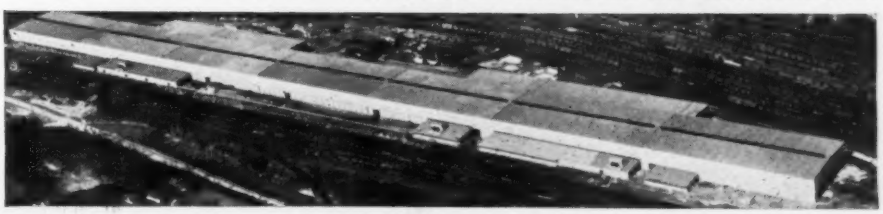
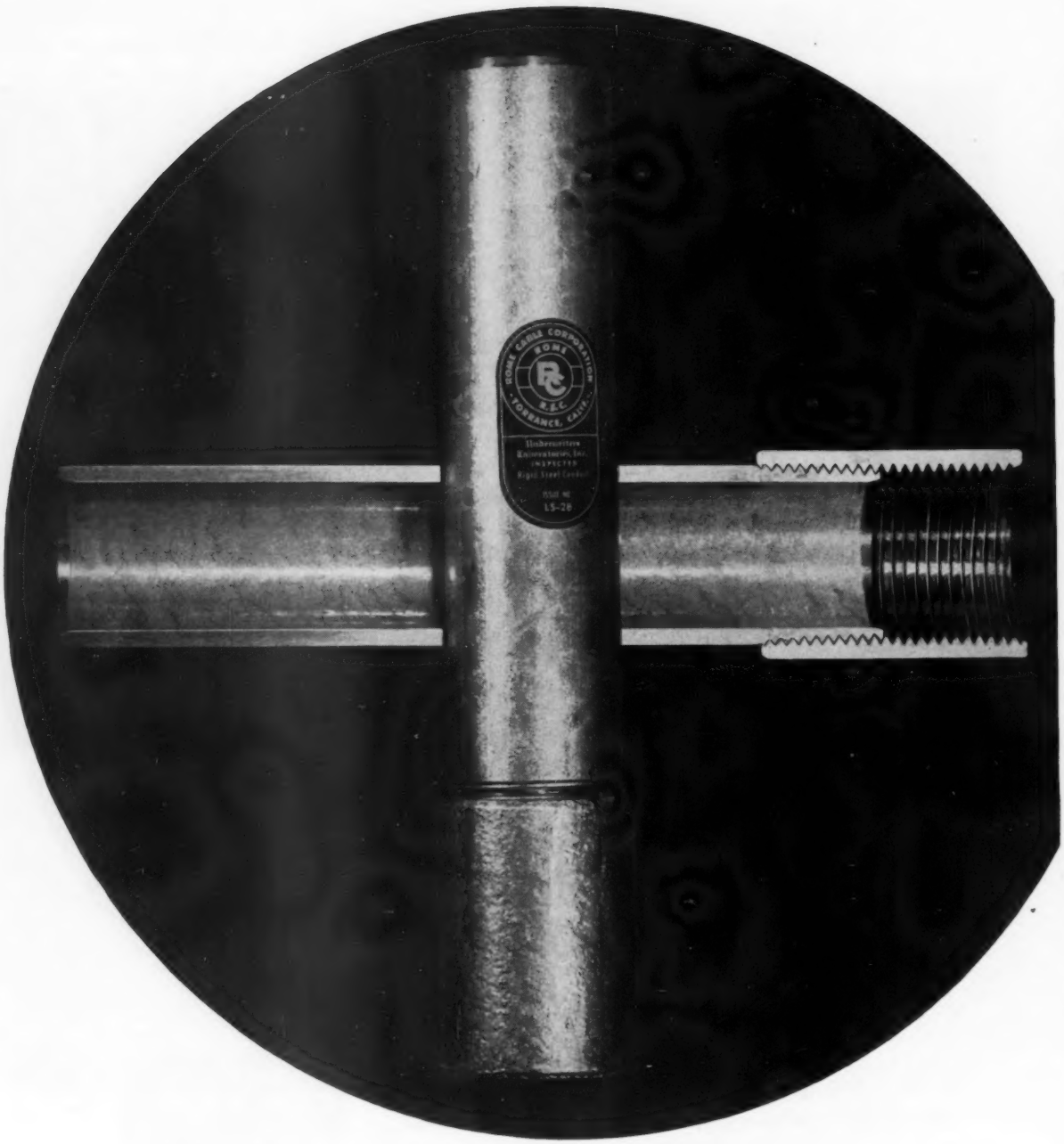


A typical Ortlip Company project —the Pennsylvania Railroad Company's Samuel Rea Shop, Hollidaysburg, Pa. Covering over 700,000 sq. ft. of area, it is lighted with Day-Brite CFI (Comfort For Industry) fixtures.



Cutaway section of Rome • Rigid. Rome • Rigid is threaded to give you fast, easy coupling connections in assembly.

You get corrosion-free protection from Rome • Rigid's hot-dip galvanized coating. It takes bending and rebending without flaking.

Rome • Rigid is stocked at Torrance, California, for immediate shipment in sizes ½" to 6".

INSIDE AND OUT

the finish of Rome • Rigid means lower installation costs

Because that's where your cable goes, it's important that the inside of your conduit be smooth. There should be no burrs, no flash, no rust, no finish that flakes—just a smooth surface.

That's what it's like inside Rome • Rigid. As a matter of fact, it's like that on the *outside*, too. And it stays that way.

There are a number of reasons why Rome • Rigid is so smooth. First, it's made from hot-rolled sheet steel, shot blasted on both sides to remove all dirt, rust and roughness.

Then, it's cold formed, thereby maintaining uniformity of wall thickness and strength and electric resistance welded into a strong pipe of uniform diameter and surface quality. A scarfing tool removes any weld flash, inside and out.

The exclusive Sendzimir hot-dip galvanizing process, which follows, gives Rome • Rigid a bright annealed oxide-free surface. First, a flame preheater, with carefully controlled atmosphere, burns off dirt, oil or scale. Next a reducing furnace completely anneals the pipe, making it soft and ductile; and the blue oxide surface left by the flame preheater is reduced to a mirror-smooth, clean finish, free of stains.

From the reducing atmosphere of the furnace, the conduit goes directly into the zinc bath without temperature variation or chance of oxidation. A steam wipe removes excess zinc.

Bending without flaking • This results in conduit zinc so bonded that it will take an unbelievably high degree of distortion and bending with complete absence of flaking.

A smooth, easy-to-fish inside finish • You get conduit with a slick, low-friction inside finish that's easy to fish, easy on your cable.

Production is quality controlled at every step, giving you a rigid conduit that's easy to work with when you buy Rome • Rigid. Smooth inside for trouble-free pulling. An outside finish that can take bending and rebending without flaking. Find out for yourself why Rome • Rigid is the favorite heavy-wall steel conduit in the West.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

THINWALL CONDUIT

Rome • EMT is a superior electrical metallic tubing, electrically welded for extra strength. It *is easier to fish than any other EMT on the market today* because of its sparkling new inside finish. The exterior finish is new also: a Rome process which not only combats corrosion but looks smooth and clean as well. Mirror-smooth inside—clean, smooth and neat appearing outside—Rome • EMT is an outstanding value. Compare it for yourself against *any* other EMT on the market.

Rome • EMT is immediately available in sizes ½" through 2" from the following Stock Distribution Centers:

Atlanta, Ga.
Chicago, Ill.
Dallas, Texas
Denver, Colo.
Houston, Texas
Kansas City, Mo.
Los Angeles, Calif.
Rome, N. Y.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
St. Paul, Minn.
Torrance, Calif.

FPC Rejects Attempt To Get Mayfield Dam

The Federal Power Commission has rejected the Lewis County PUD's application to take over Tacoma City Light's permit for construction of Mayfield Dam on the Cowlitz River.

The PUD's action was reportedly taken to place it first in line in the event Tacoma is not permitted to build the dam because of a 1909 navigation law. The case is pending before the Washington Supreme Court.

Dean Barline, Tacoma utilities director, said: "Many private power firms and at least this one PUD stand ready to purchase Tacoma's license in case an action . . . is decided against the city."

Box Canyon Dedicated With July Ceremonies

Box Canyon Dam of the Pend Oreille River was dedicated July 21 at a ceremony that brought out several regional and state dignitaries.

Dr. William A. Pearl, Bonneville administrator, said at the dedication that power needs of the next 20 years will require an estimated capital investment of about $7 billion.

"It is obvious the federal government cannot assume this staggering responsibility," Pearl said. "To meet the power requirements of Washington, Oregon, northern Idaho and western Montana over the next five years will require an additional 2,000,000 kw or about 30 dams the size of Box Canyon.

Noxon Rapids Project Gets Official Start

Gov. J. Hugo Aronson of Montana pulled the switch that set off a dynamite explosion to start construction of Noxon Rapids Dam of Washington Water Power Co.

Located on the Clark Fork River, the project will produce 400,000 kw and cost $87,000,000.

Among the special guests at the ceremony were Dr. William A. Pearl, Bonneville administrator, and Fred C. Gardner, president of Ebasco Services. WWP President Kinsey M. Robinson was host. The first power will be produced in September 1959.

• **The British Columbia Power Commission** will purchase the Canadian Utilities Limited 1,400-kw diesel generating plant and electrical distribution system at Fort St. John, in the Peace River district. The plant supplies power to about 730 customers.

Work on Tacoma's Mayfield Dam progresses in spite of legal difficulties still pending

Chief Joseph Program Features Army Executive

Development of the Columbia River Basin in the Pacific Northwest must be carried out by a "multisided" partnership, George Roderick, assistant secretary of the Army, declared June 12 in a speech at the dedication of Chief Joseph Dam on the Columbia River.

Roderick defined the Eisenhower partnership power program as "the opposite of a centralized, remote-controlled program," involving a "multisided partnership in planning and a multisided partnership in sharing costs."

The Army Corps of Engineers, which built Chief Joseph Dam at a cost of $160,000,000, has a backlog of $9,000,000 in "much-needed projects" which have been authorized by Congress but for which appropriations are unavailable, said Roderick.

"Many projects may have to wait indefinitely," said the assistant secretary. "The only answer is for local interests—whether state, municipal, private or all of them—to take a hand in the planning and then underwrite a fair share of the costs. This will insure that projects really conform to local needs and will make our water-resources dollar go twice as far."

Harold E. Stassen, special assistant to President Eisenhower, delivered the dedication address for the new dam, which he termed: "a magnificent tribute to the industry and initiative that flows everlastingly from the wellsprings of freedom."

Computer Study Group Formed in Arizona

Formation of the first combined research group to fully explore possible uses of electronic computer systems in solving operating and engineering problems in the electric and gas industry was announced this month by Walter T. Lucking, president of Arizona Public Service Co.

Initial participants in the research group include the Arizona utility, American and Foreign Power Co., and Remington Rand.

Aims of the group are to broaden existing methods in the field of computer applications of an operating and engineering nature for the electric and gas industry.

"Because of the great potential these computer systems hold for the industry, we feel it is important to develop the techniques of full use as rapidly as possible," Lucking stated. "By bringing together our separate skills and techniques we hope to speed this development."

Headquarters for the research will be in Phoenix where the group will study computer applications on the Univac system recently ordered by Arizona Public Service.

• **Salt River Power District** has purchased a 6,250-kva mobile substation, Arizona's first, from Westinghouse Electric Corp. The 26-ton unit will be kept at Phoenix ready for use during emergencies at any of the district's 40 substations.

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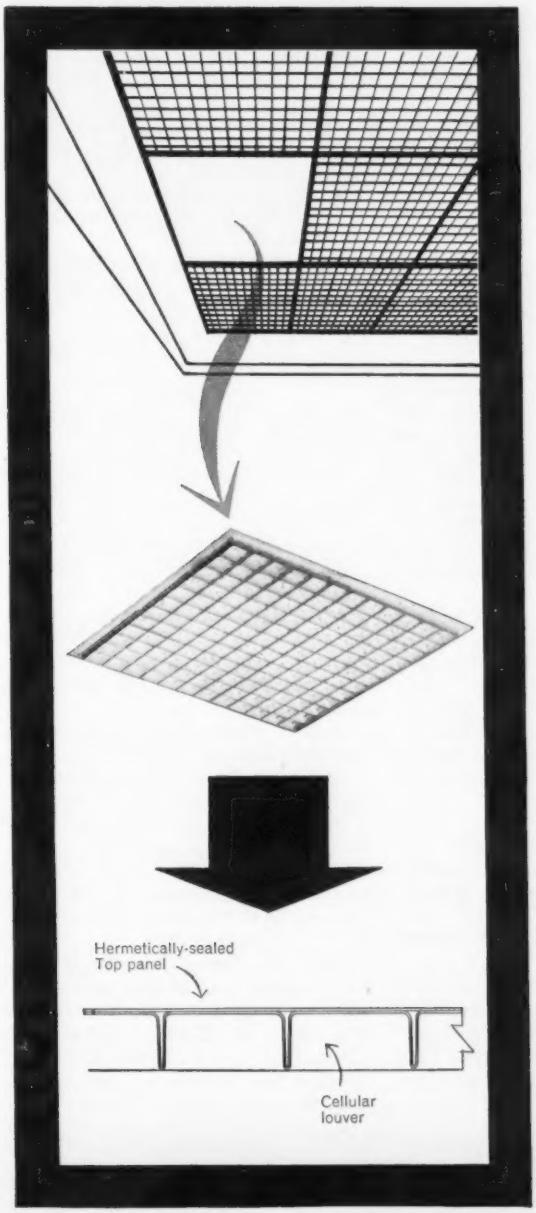
A brand new product...exclusive new concept



CURTICELL* louver-diffuser

CurtiCell is beauty, performance, efficiency and economy—a brand new Curtis product.

CurtiCell consists of two hermetically sealed, diffusing vinyl chloride plastic sheets—a flat top sheet and a vacuum-formed bottom sheet providing 25° shielding—that make Curti-Cell the only light control element to diffuse and louver the light, an exclusive new concept by Curtis. CurtiCell louver-diffuser elements are available in 2′ x 2′ and 2′ x 4′ sizes in frosted-clear transparent and translucent white plastic. New Curtis luminaires using CurtiCell will soon be announced, watch for them. Use the coupon to send for CurtiCell information, the newest Curtis product with the exclusive new concept.

* Pat. Pend.

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SMUD Starts to Build Florin-Folsom Towers

Sacramento Municipal Utility District has started tower construction on a 22-mile high-voltage line from Hedge substation near Florin to the Folsom Dam power plant. This will give SMUD its second direct connection to the Central Valley Project power system operated by the U. S. Bureau of Reclamation.

The single-circuit 115-kv line will have 115 steel towers averaging 125 ft high, and will cost approximately $700,000. The towers will be large enough to carry 230-kv power, but until the Upper American River Project is producing energy the line will be insulated for only 115,000 v.

It is scheduled for completion Dec. 1.

UP&L Extends Service To Serve Uranium Mill

Utah Power & Light Co. is going to extend its southeastern Utah "uranium circuit" another 70 miles to include Blanding. The Texas Zinc Minerals Co. will tie in at Blanding and run a line to Mexican Hat, the location of its big uranium mill.

Special equipment will be necessary to keep voltage up on the extension, but increased demand in the area may call for construction of a steam-electric generating station eventually.

New Building Under Way By Los Angeles Utility

The Los Angeles Water & Power Department will begin construction this month on a new $829,675, 50,500-sq-ft shop and office building for the repair and overhaul of heavy generating units and other heavy equipment used in the city's power system.

The new building will be located at the present repair division site in downtown Los Angeles, and will expand and consolidate repair activities now handled in separate structures.

Completion of construction by McDonald Bros. is expected in about nine months.

• **Tucson Gas, Electric Light & Power** Co. is considering expansion and construction of a service center to cost nearly $500,000.

• **Mason County PUD No. 3** of Shelton, Wash., has applied to the Washington Department of Conservation and Development for water rights on the Hamma Hamma River. The PUD wants to build a 15,000-kw power dam and store water for domestic use.

• **Failure** between high- and low-voltage windings in an English Electric Co. transformer at Chief Joseph Dam recently is still unexplained. About 280,000 kw were dumped from the federal system load for two hours because of the failure.

Bids and Contracts

• **Successful bidder** on construction of Rocky Reach Dam for the Chelan County PUD, Wenatchee, Wash., is a combination made up of Arundel Corp., L. E. Dixon Co., Hunkin Conkey Construction Co. and American Pipe & Construction Co. The low bid was $12,000,000, less than half the engineers' estimate of $25,000,000.

• **Stone & Webster** Engineering Corp., supervisor of construction of Puget Sound Power & Light's Upper Baker Dam, announces that contracts for various phases of the work will be awarded soon. General Electric Co. is to supply generators, S. Morgan Smith Co. the butterfly valves and Baldwin-Lima-Hamilton Corp. the turbines. Superior Portland Cement Co. and Olympic Portland Cement Co. have the concrete supply contracts.

• **Mullenback Division** of Electric Machinery Mfg. Co. has been awarded a $58,404 contract by the Portland District, Corps of Engineers, for the design, manufacture, test and delivery of three substations and one lot of spare parts. The substations will be used to supply power for the operation of The Dalles spillway dam and power for the water supply system.

• **Walsh Construction** Co. has contracts to build two tunnels on the North Fork of the Feather River for Pacific Gas and Electric Co.

• **Northwood** Inc. will build a diversion tunnel for Cougar Dam for the Corps of Engineers. Contract is for $571,636.

• **Northern Construction** Co. and **J. W. Stewart** Ltd. have been awarded a $1,400,000 contract for construction of British Columbia Electric Co.'s 22,500-kw generating station at Bridge River.

• **Westinghouse Electric Corp.** submitted a low bid of $1,059,156 to furnish 14 unit substations to Seattle City Light. Substations are rated at 5,000 kva and 26 kv.

• **Award** of four contracts for reconstruction of British Columbia Electric Co.'s Clowhom hydroelectric generating station is announced. **Canadian Westinghouse** Ltd. will supply the generator for $501,000; **Vancouver Iron Works,** Ltd., turbine, $461,110; **Dominion Bridge** Co. Ltd., penstock and surge tank, $250,000; and **Dominion Engineering** Co. Ltd., butterfly valves, $140,000.

Bonneville Awards

Sierra Electric Co., $34,128, will construct the 1.6-mile Hedges tap to the McNary-Franklin 115-kv line.

L. B. Read and **Mac Sharp** received a contract for $129,614 to construct switchyard and control-house additions at Longview substation.

H. B. Nesheim will build Pelican Horn substation for $20,177.

Tucker Sno-Cat Corp. will supply a snow tractor and trailer for $15,749.

Olson Electric Co. is to build shunt-capacitor additions at Aberdeen substation for $4,032.

Mann Construction Co. has a contract for $10,103 to build Shaniko radio stations.

Bethlehem Pacific Coast Steel Co. will supply tower steel for $72,981.

John M. King Co. has a $79,655 contract to build transformer bank No. 7 additions and helicopter hangar at Glenn H. Bell substation. The same company will build Chief Joseph switchyard step II additions for $148,782.

Electric Transmisssion Equipment Co. will provide suspension insulators for $134,706.

Power circuit breakers on bid invitation 8007 will be supplied by: **Kelman Electric & Mfg.** Co., group I (partial) $23,348; **General Electric** Co., group I (partial) $148,500; **Westinghouse Electric** Corp., group II, $66,000; and **Federal Pacific Electric** Co., groups III and IV, $510,436.

Award is announced on invitation 7995 for three-phase power transformers to **Legano Electric** Corp., $450,740, and **Moloney Electric** Co., $110,252.

Conductor and accessories in invitation 8029 will be supplied by **Anaconda Wire & Cable** Co. for $203,901 and **Kaiser Aluminum & Chemical Sales** for $142,910. Items 16 and 24 are excepted in Kaiser's bid.

Mike B. Porter Excavating Co., has a right-of-way clearing and access road building contract for $25,646. Work is on the 25-mile Oregon City-Chemawa 230-kv transmission line.

Mann Construction Co. will build a maintenance building at Grand Coulee Dam for $14,072. The company also will construct a maintenance headquarters building at Chief Joseph switchyard for $48,755.

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HIGH WATTAGE HEATERS

Titan's new HI-WATT Heaters with Therm-O-Dial Control, smart styling room penetrating heating efficiency *and full 10 year guarantee**

Titan makes a streamlined beauty out of a "work-horse" heater . . . for Titan's HI-WATTS are built for work. Yes, built to fill the room with clean, draftless convection heat. And with the superb heating efficiency HI-WATT Heaters offer all the important convenience giving, safety approved features that have made TITAN HEATERS the volume heater line of America.

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Titan HI-WATT HEATERS

* TITAN 10 YEAR ELEMENT GUARANTEE: The elements of the HI-WATT Heaters are unconditionally guaranteed for 10 full years of trouble free service. TITAN open elements are specifically incorporated into the HI-WATT Heater's design because they heat faster, give more radiation and optimum heating efficiency.

THERM-O-DIAL CONTROLS: Set it . . . then forget it for the accurate, precise built-in thermostat control keeps the room always in the "comfort-zone". Automatically, the Therm-O-Dial Control turns heater on and off keeping room at the desired pre-selected heat.

TEMPERATURE LIMIT CONTROL: This special safety feature insures against excessive heat concentrating inside the heater case. In the event it is inadvertently tipped over, or the air circulation is impeded or impaired the heater turns itself off instantly and automatically.

EVER COOL CASE: TITAN'S unique construction design enables the heater case to remain cool to the touch regardless of hours of operation. Proof — that all heat is projected into the "comfort-zone", none is trapped and wasted within the heater.

TWO-TONE PEARLIZED FINISH: The finest materials and pigments are baked on to resist chipping and cracking and give TITAN HI-WATT Heaters a beautiful, smooth, satiny two-tone finish.

SUPER-SILENT FAN AND MOTOR: A powerful, yet silent operating motor and wide blade fan assure a soft, draftless, yet positive projection of heated air to all parts of the room area.

LIVE POWER SIGNAL INDICATOR: For added safety, you can always tell at a glance when your heater is on . . . because this signal goes on the minute the heater goes on and stays lighted until the heater is turned off.

UNDERWRITERS LISTING: HI-WATT Heaters — like all TITAN products are tested and listed by the Underwriters Laboratory, the standard of safety of the electrical industry.

Model 66 . . . . . 3,000 watts, 230 volts, 60 Cycle AC
Model 67 . . . . . 4,000 watts, 230 volts, 60 Cycle AC
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A financial giant, the new Texas National Bank rises on the fabulous Texas Gulf coast. Marcus transformers provide "money in the bank" dependability for power and lighting distribution. For trouble-free performance and greater profits, choose Marcus for your next transformer installation.

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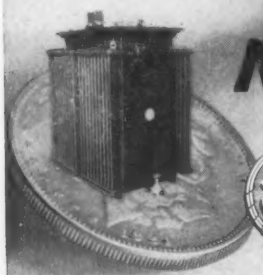

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NEWS ABOUT PEOPLE

• **William E. Trommershausen,** former area manager for Bonneville Power Administration, has joined R. W. Beck & Associates, utility analysts and engineers. He will specialize in power contracts, load forecasting, system planning, distribution and high-voltage problems.

• **Thomas Quast** and **Bob Jones** have been re-elected chairman and secretary, respectively, of the Washington State Power Commission. **Stuart Foster** was elected vice-chairman.

• **George Brunzell,** manager of the Spokane division of Washington Water Power Co., has been appointed assistant to Kinsey M. Robinson, president. He will continue his duties as division manager.

• **C. W. De Voe** is now assistant comptroller of San Diego Gas & Electric Co. He was also elected assistant treasurer of the company at a recent meeting of the board of directors.

• **E. Douglas Sutcliffe** is executive assistant to W. C. Mainwaring, president of the new Western Development & Power Ltd., a subsidiary of British Columbia Power Corp. He was formerly executive assistant to the general manager of the transportation division of B. C. Electric.

• **John M. Nelson,** assistant superintendent of Seattle City Light, is chairman of an advisory committee from 12 regional public and private power utilities that are to purchase power from the Priest Rapids project. Other officers are **Arthur Porter,** Portland, vice-chairman, and **Charles Monson,** Seattle, secretary-treasurer.

• **Maynard W. Johnson,** manager of the Oakland plant of General Electric's distribution transformer department, has been promoted to general manager of the larger motor and generator department in Schnectady, N. Y.

• **William D. Keleher** and **Otto W. Drager** have been appointed district representatives for General Electric's Construction Materials Division. Keleher will handle wiring device accounts in the San Francisco area and Drager will have wiring devices, conduit, wire and cable in the Seattle area.

Royer

• **J. E. E. Royer,** vice-president and general manager of Washington Water Power Co. since 1932, retired from the position in July. He is the company's oldest active employee in point of service. He will continue as a member of the board of directors and the executive and retirement committees. Royer joined the company in 1907 as a helper on a generator repair crew, became system operator in 1918 and general manager in 1930. He was named a vice-president two years later.

Westinghouse Employees Get Several Promotions

Westinghouse Electric announces several Western personnel changes.

Ray T. Killen is appointed district agency and construction manager at Seattle to succeed **William L. Trudigian.** Trudigian is now Pacific Coast regional agency and construction manager with headquarters in San Francisco.

Robert E. Halstin has the newly established position of area sales manager for apparatus in Portland.

Clyde H. Wood, former Pacific Coast regional agency and construction manager, will attend the advanced management program at the University of Hawaii this summer and then take an assignment in the East.

Frank M. Ogden, former apparatus sales engineer in the San Francisco district, has been appointed assistant to the general sales manager of the company's lamp division.

Lyle Connell is now superintendent of quality control at the Westinghouse Sunnyvale, Calif., plant. He replaces Richard N. Parkin who was recently named special project manager.

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

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INSULATION for electrical-electronic applications

SIL-THIN-GLAS AND SIL-THIN-BESTOS—Extra-thin high temperature insulation for wrapping armatures, fields, stators, relays, transformers and coils.

STICK-GLASS*: Wrapping for small coils where space is limited and holding down of wrapping is difficult. Ideal for toroidal coils. Thicknesses .005″-0.15″. Dielectric strength of "A" glass (1300 vpm).

SUN-PLI—Asbestos paper combinations. Improved mechanical and electrical strength plus high moisture resistance.

SIL-GLAS—Uses: coil wrap or tape—slot cell insul.-layer insulation. Flexible 200°C heat resistance, good abrasive resistance, 2.5 Dielectric constant at 25°C. ¼″ diel. breakdown 5000 V @ .003″ to 10,000 V @ .010″. 1% power factor. Thicknesses .003″-.010″.

ELASTOMERIC FIBERGLAS—Highly water repellent. Impregnated and coated with silicone rubber. Cured or uncured. Baking uncured to 360°F provides after-cure for tough, abrasive-resistant finish. Cured E-F has dielectric strength of 800 VPM @ 25°C for .007″, and power factor of 0.7%.

BI-GLAS—Class "B"—bias woven Fiberglas tape for fast wrapping of coils, spirals, etc. Stretches and contour wraps without electrical loss, coning or air pockets.

ACTO-GLAS—Fiberglas cloth preimpregnated with polyester or silicone resin. In 36″ rolls or tape. Dielectric strength to 700 VPM. Low moisture absorption, high impact resistance, high flexural strength. Gauges from .004″ to .012″.

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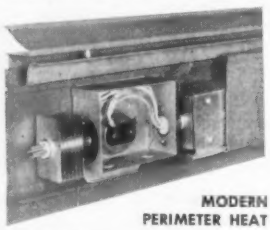
(Illustration of cut-a-way section)



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BASEBOARD UNITS—available in many lengths and wattages. They are designed for a completely harmonized installation in any room. Units may be joined; blank sections available for extensions.
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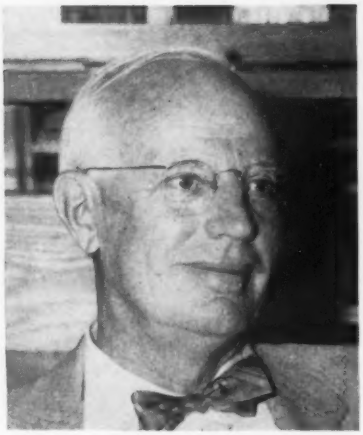

Boylan

Talley

Calectric Executive Announces Retirement

Retirement of Howard Boylan as vice-president and comptroller of California Electric Power Co. and the subsequent appointment of John A. Talley to that position has been announced.

Boylan was associated with the company for 33 years. He was named vice-president in 1942 and became vice-president and comptroller in 1943. During his years with the company he is credited with playing a leading role in the transition of Calectric from a small to a major utility.

His successor, Talley, has been assistant comptroller since 1951 and has been associated with the company since 1924. He is also chairman of Calectric's labor relations committee and directed development of the company's expanded employees' pension plan and its disability insurance plan.

• **William O. Proby & Associates** Inc., manufacturers' representative, is now in a new office and warehouse at 2915 13th Ave., S.W., Seattle. The outstanding new building was designed by Wortman & Wilkins of Seattle, and built by Strand Inc.

• **Robert R. Prussia,** 524 Second St., San Francisco, is a new representative of Berko Electric Mfg. Co., makers of a new line of glass radiant heating panels.

• **J. C. Epperson** Co., San Francisco, now represents the illuminating division of the Miller Co. in California. Sales engineer will be Raymond E. Cook who recently joined Epperson.

• **Julio W. Silva** has been named to fill a vacancy on the Eugene Water & Electric Board until the November election. E. S. Wengert resigned.

• **Leon S. Heseman** is now serving as senior assistant treasurer of California Electric Power Co. It is a new position.

• **Melvin Julson** is new electrical superintendent for the Powell River Co. He succeeds E. G. Craigen who retired in June.

Deaths

Heston

Heart Attack Is Fatal To Well-Known Editor

Walter C. Heston, distinguished by his cameras and his keen inquiries into the engineering phases of this industry, dreamer as to its future and staunch

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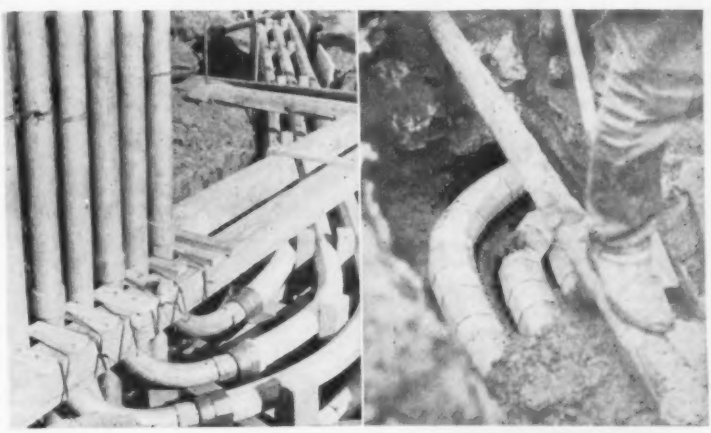

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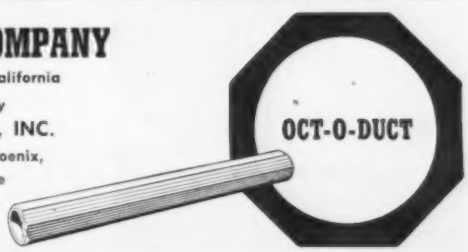

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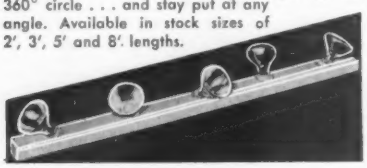

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salesman of its present potentials, died of a heart attack at his Berkeley, Calif., home, July 6. In his late 63rd year he had been contemplating retirement next year. He was a native of Oregon.

Mr. Heston's long and valuable career in the Western electric utility industry began with his employment by the Portland Railway Light & Power Co., a predecessor of Portland General Electric Co.

In 1922 he became Pacific Coast editor of *Electrical World*, a position he held until 1932.

After leaving *Electrical World*, Mr. Heston worked with electrical contractors on such projects as the transmission line from Hoover Dam to the Metropolitan Water District, and then served as engineer for power companies at Boulder Creek, Calif., and Crescent City.

In 1939 he joined the lighting staff of Pacific Gas and Electric Co. in San Francisco. Later he became industrial engineer for the Northern California Electrical Bureau and carried forward with imagination a successful commercial building wiring modernization program. After this service, he was an electrical engineer at Marinship in Sausalito, Calif., and also taught electrical apprentices at Samuel Gompers Trade School.

After the beginning of World War II, Mr. Heston joined the staff of ELECTRICAL WEST in 1943 as engineering editor, the position he held at the time of his death. He was a member of the Pacific Coast Electrical Assn., the American Institute of Electrical Engineers, the Electric Club of San Francisco and the Engineers Club of San Francisco.

• **Jean Cyr,** whose cartoon illustrations appeared for many years in ELECTRICAL WEST, particularly in the Sales Guide, succumbed to leukemia, July 14 at a Berkeley hospital. She was the wife of William A. Cyr, consulting editor. Early this year she had resumed making illustrations for the Electra's Husband page but had to stop because of her fatal illness. She had made many friends in the electrical industry, attending conventions and meetings. Her cartoon style was simple and incisive, often incorporating subtle satire. In this respect some of her most penetrating sketches were done for convention dailies that were once issued at PCEA conventions.

• **Walter J. Dennis,** 75, a former assistant general manager of the Northwestern Electric Co. before it merged with Pacific Power & Light, died in Portland after a long illness. He was a native of Texas and attended Wesleyan University. He first worked for Portland Railway Light & Power Co. and then joined Northwestern in 1913. He was named assistant general manager in 1924.

• **Frederick L. Witsell,** 59, vice-president in charge of employee relations for Public Service Co. of Colo., died June 30 after a brief illness. He began his utility career in 1917 with the Toledo Edison Co., became president and general manager of Pueblo Gas & Fuel Co. in 1940, and joined Public Service Co. in 1948 in the position he held at the time of his death. He was a member of the board of directors and the management committee.

• **Claude Belmont Smith,** retired assistant secretary-treasurer of the West Kootenay Power & Light Co., died at his Vancouver, B. C., home recently. He had retired in 1940 after 11 years with the company.

• **William Dredge Fleet,** 79, another veteran of the Canadian electrical industry, died recently in Vancouver. His career extended back to the turn of the century when he joined the Royal Electric & Mfg. Co., Montreal. He was best known in the Western areas as consultant on various projects.

• **Maj. Walter Thomas Haynes,** 81, who retired just a year ago from service with the British Columbia Power Commission, died in July. He was a native of Charlottetown, Prince Edward Island, educated in England and a resident of Canada since 1895.

• **William M. Bennett,** 52, head of Bennett Electric, which he founded in 1929, died at his home in Vancouver, B. C. He was also proprietor of the Playfair Club and the popular master of ceremonies of the Kitsilano Showboat, a community enterprise. He was past president of the Kitsilano Chamber of Commerce, a member of the Royal Vancouver Yacht Club and a director of the Burrard Lions Club.

• **Edwin H. Iverson,** 54, a former electrical engineer for Puget Sound Power & Light Co., died at Seattle July 9. He was graduated in electrical engineering from the University of Washington in 1937. He worked for Puget until becoming ill several years ago.

• **George W. Mickle,** 74, a member of the Arizona Public Service Co. board of directors since 1946, died after an illness of nine weeks. He was a native of Coolville, Ohio, and a prominent Phoenix farmer, businessman and civic leader.

NOTES ON THE TRADE

• **General Electric Co.** is going to build a $2,000,000 lamp division warehouse, distribution and office center in the Vail Field area near Los Angeles. Completion is scheduled for January 1957. Architects and engineers for the project are Albert C. Martin & Associates; joint contractors are Noyes Roach and C. L. Peck.

• **Triad Transformer Corp.**, Venice, Calif., celebrated the opening of its third plant building with a ribbon-cutting ceremony. The plant covers 16,000 sq ft and houses jobber sales and inventory, machine shop and shipping department.

• **Marvin Electric Mfg. Co.** is now a wholly owned subsidiary of Progress Mfg. Co. after a merger announced recently. The two lines of products combined cover a wide range of lighting fixture and ventilating equipment products.

• **Automatic Switch Co.** announces appointment of two new Western distributors of Asco solenoid valves. They are **Hydraulic Equipment Co.**, 5924 E. Olympic Blvd., Los Angeles, and **Hendrie & Bolthoff Co.**, 1635 17th St., Denver.

• **S. Morgan Smith Co.** is building three 280-in. turbines for installation at Ice Harbor Dam on the Snake River. They will be the largest Smith-Kaplan turbines in the world with a rating of 143,000 hp.

• **S & M Supply Co.**, Grand Junction, Colo., has been named distributor of Allis-Chalmers motors, controls and transformers in western Colorado and eastern Utah.

• **Rockbestos Products Corp.**, wire and cable manufacturer, has reopened a Seattle district sales office at 4906 Sixth Ave. N.W. **F. J. Balzer,** formerly with Roebling Co., is the new area sales representative.

• **Thomas & Betts Co.** is constructing a new building in Los Angeles for warehouse and sales headquarters. It is the company's third expansion in the area in the past 15 years.

• **P & D Appliance Center** has moved to new quarters. New address is 145 Second St., San Francisco.

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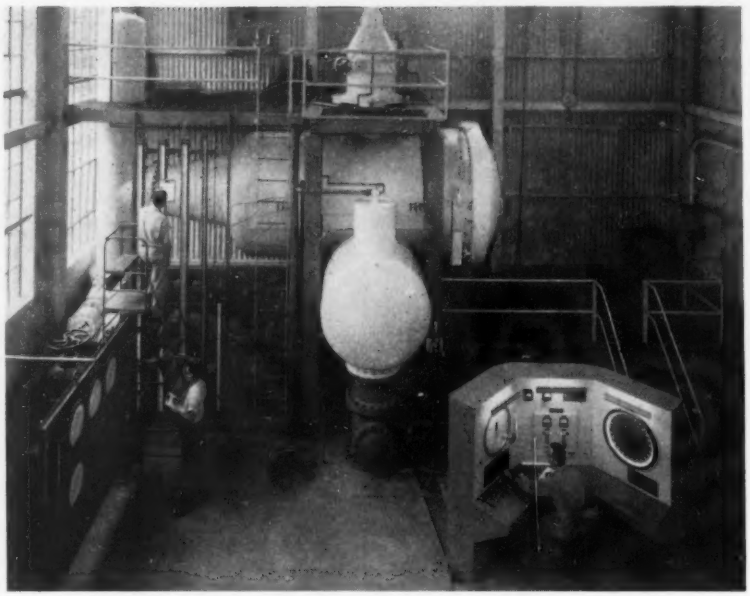
At York, Pa., the S. Morgan Smith Co. has in operation a new high head test stand that permits hydraulic model testing under heads up to 300 ft and 12-in. discharge diameter models.

The new facility is used both for basic research, particularly cavitation studies, and for the conduct of formal contract acceptance tests with particular emphasis on the duplication of field conditions. Complete tests on a Francis turbine including power and efficiency, cavitation and runaway speed versus "Sigma" can be run in four days.

A number of interesting model studies have already been completed, including the testing of the model Francis runner, wicket gates and stay vanes for the Brownlee development of the Idaho Power Co.'s Hells Canyon project. Turbines for that project will be the highest capacity Francis turbines yet produced by S. Morgan Smith.

Recently concluded are tests of model units for the City of Seattle's Gorge power house project. This project, which will be reported in detail in a future issue of ELECTRICAL WEST, involves increasing the height of Gorge Dam and increasing the capacity of the original hydraulic units which were placed in service in 1921. The use of the new high head test stand for these studies materially reduce the risks involved in a major reconstruction project of this type.



A new high head stand of S. Morgan Smith Co. at York permits model testing up to 300 ft

• **Harvey Aluminum** announces that all financial and contractual arrangements are made for construction of a 54,000-ton aluminum reduction plant at The Dalles. Work resumed about Aug. 1 after a four-year interruption. A long-term program of expansion calls for an ultimate capacity of 67,000 tons, a second reduction plant of 67,000 tons and a 130,000-ton alumina plant.

• **Peerless Electric** Co., San Francisco, announces the promotion of two key employees. **Ray C. Dameral** is now chief of design, production and shop personnel; **Charles Krinard** is sales and office manager. The company is a leading Western lighting fixture manufacturer.

• **"Stringin' Along With Pengo"** is the name of a movie made available on loan to utilities by Peterson Engineering Co., Santa Clara, Calif. Subject is the stringing of 1,033,500-CM grease impregnated ACSR on a twin-circuit tower line for Southern California Edison Co. in Los Angeles. Bechtel Corp. installed the line.

• **R. A. Darling** Co., Wheat Ridge, Colo., is a new sales representative for J. F. Pritchard & Co. of California. Darling Co.'s territory includes Colorado, Wyoming and parts of South Dakota and Nebraska.

CUTTER LABORATORIES, Berkeley, Calif., pharmaceutical house, is now a manufacturer of plastic louvres for fluorescent lighting fixtures. Cutter recently purchased all the outstanding common stock of George A. Coleman Co. Inc., owner of Pacific Plastic Products Co., San Francisco. Robert Greenhood, president of Pacific Plastics, continues as manager of the plastic business

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If your work is at all concerned with industrial lighting equipment, make sure you have this latest edition RLM Specifications Book—you'll recognize it by its green cover with the big red-and-black RLM Label. For your complimentary copy, write to the Institute, or use the coupon.

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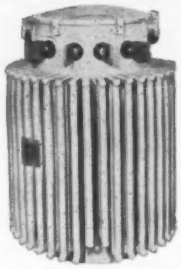

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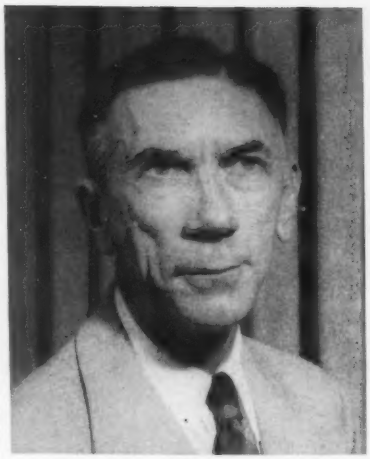

Bennett

Hedrich

• **Otto H. Hedrich** and **Charles B. Bennett** have received promotions in the Fluor Corp. Ltd. organization. Hedrich is principal power engineer, mechanical, and Bennett is principal power engineer, electrical. Both men are members of PCEA, and Hedrich was recently named Engineer of the Year in the California area by the National Association of Power Engineers. Hedrich is a member of ASME and Bennett is a member of AIEE.

TOURING the nation this summer is a mobile exhibit of the electrical products of I-T-E Circuit Breaker Co. Displayed in the 33-ft demonstration trailer are such products as operable 15-kv switchgear, new isolated-phase bus, low-voltage draw-out switchgear and many other smaller components. Products not actually aboard are illustrated in wall-mounted photo books, colored murals and in a shadow box with horizontal panels. The center panel is translucent Plexiglas, back-lighted to show a diagram of a complete electrical system from generation through distribution to utilization. Above and below are transparencies showing I-T-E products keyed to their application in the electrical system. Attendance is by invitation from all field offices

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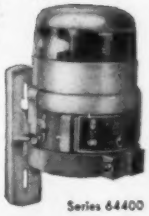

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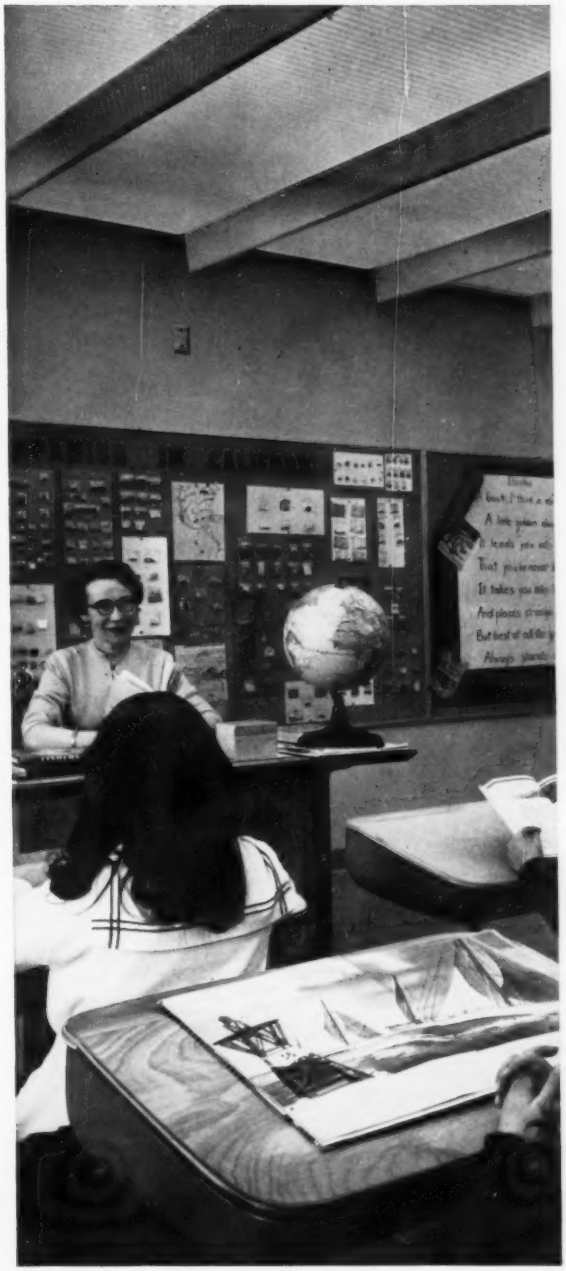
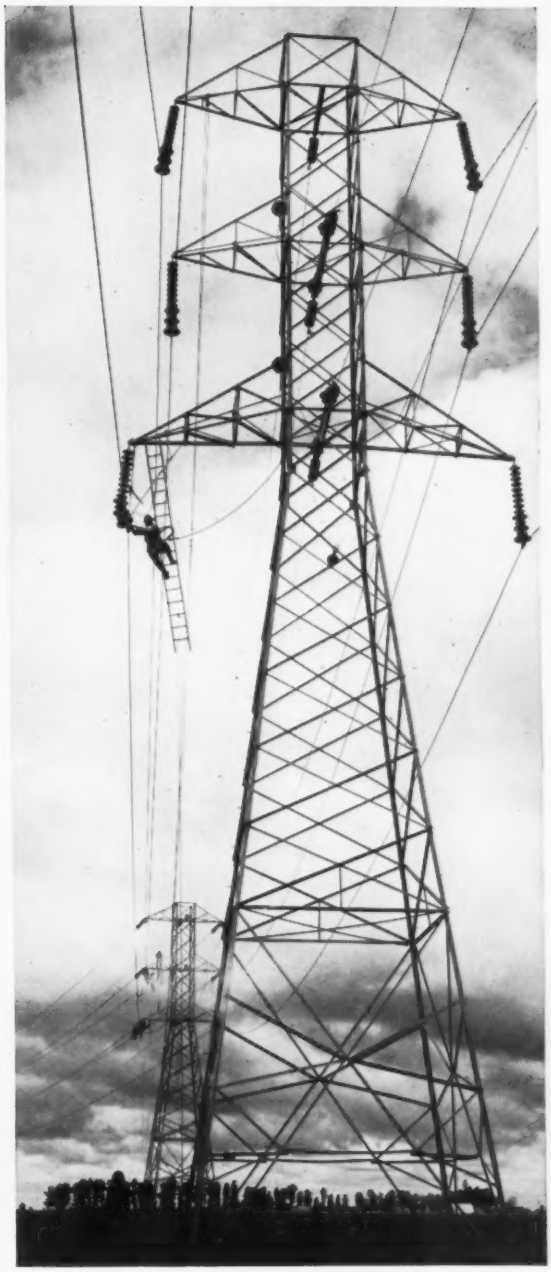
PROFILES

Norman R. Sutherland, president of Pacific Gas and Electric Co., receives the National Safety Council Award of Honor for the second consecutive year in recognition of the company's successful efforts to reduce lost-time accidents. Iver C. Larson, right, the council's San Francisco executive vice-president, presents the award. PG and E is one of only four electric utilities honored

Bill Gribble, long-time Thermador representative in northern California (right) took over the reins of the East Bay Electric Club at Oakland from Frank Rothganger of PG and E Co., when the club closed down for summer vacation. He will reopen meetings of this active club in September

Packard-Bell's 1956 Distributors Convention in Los Angeles attracted more than 3,000 people to view the new products, and many who were entertained by Art Linkletter, guest of honor. The company acknowledged its 30th anniversary and also production of its two-millionth consumer electronic product. From left to right are: Jean P. Gleis, vice-president in charge of manufacturing; Linkletter; Robert S. Bell, executive vice-president and general manager; and Kenneth Johnson, vice-president in charge of sales for the company





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Thanks to this new concept in the promotion of adequate wiring, the electric industry can now explain to its customers in simple terms the complexities of *in*adequate wiring. The four out of five householders who haven't as yet received the word are now starting to get it. And what a satisfying word it is—HOUSEPOWER—*full* HOUSEPOWER!

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To learn more about the HOUSEPOWER promotion, as well as other PCEA activities, contact either of our offices.

PACIFIC COAST ELECTRICAL ASSOCIATION

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